REMEDIAL ACTION WORK PLAN
SHALLOW ZONE GROUNDWATER

ROBERT BOSCH TOOL CORPORATION
LEITCHFIELD DIVISION BUILDING #1
410 EMBRY DRIVE
LEITCHFIELD, KENTUCKY

Submitted to:

Kentucky Department for Environmental Protection

Division of Waste Management
Superfund Branch

Prepared by:

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AMEC Project 6680-04-9537-05

February 2012

February 6, 2012

Mr. Christopher Jung, P.G.
Hazardous Waste Branch
Division of Waste Management
Kentucky Department for Environmental Protection
200 Fair Oaks Lane
Frankfort, Kentucky 40601-1190

Subject: **Remedial Action Work Plan**
Robert Bosch Tool Corporation
Former Leitchfield Division Building #1
410 Embry Drive
Leitchfield, Grayson County, Kentucky
Agency Interest # 1579
AMEC Project 6680-04-9537-05

Dear Mr. Jung:

On behalf of our client, Robert Bosch Tool Corporation, AMEC Environment & Infrastructure, Inc. (AMEC) is pleased to submit this Remedial Action Work Plan for the subject site. MACTEC Engineering and Consulting, Inc. was acquired by AMEC in 2011. This Remedial Action Work Plan has been prepared as discussed in the *Remedial Action Pilot Test Report, Robert Bosch Tool Corporation, Leitchfield Division Building #1, 410 Embry Drive, Leitchfield, Grayson County, Kentucky, Agency Interest #1579, AMEC Project 6680-04-9537-05*, dated October 6, 2010.

Should you have any questions, please do not hesitate to contact the undersigned.

Sincerely,

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1.0 INTRODUCTION

This Remedial Action Work Plan (Work Plan) has been prepared by AMEC Environment & Infrastructure, Inc. (AMEC) at the request of Robert Bosch Tool Corporation (RBTC) for the RBTC Leitchfield Division Building #1 facility. MACTEC Engineering and Consulting, Inc. (MACTEC) was acquired by AMEC in 2011. The facility is located at 410 Embry Drive in Leitchfield, Kentucky (Figure 1).

1.1 SITE BACKGROUND

The subject property consists of an approximate seven-acre tract developed with an 86,000 square foot vacant manufacturing facility, hazardous waste accumulation building, solid waste dumpster storage building, small outbuildings, and associated driveways and parking areas. The property is located approximately 800 feet west-northwest of the intersection of Embry Drive and Salt River Road in Leitchfield, Grayson County, Kentucky.

The property was constructed in 1969 and commenced operations in 1970 in a 43,000 square foot manufacturing building. The facility originally manufactured screw driver bits, carbide drill bits, and carbide-tipped circular saws. The facility was expanded in 1974 to its current size of 86,000 square feet. From 1986 to 1996 hedge trimmers were also manufactured at the facility. Processes formerly performed at the plant included metal working and grinding, chrome and nickel plating, vapor degreasing, and salt heat treating.

In 1991, during an excavation for a sump to house the central coolant system (Henry Filter), excavation materials (soil, sand, and cement) impacted by trichloroethene (TCE) were encountered. The source of the TCE-impacted materials was reportedly from degreasing operations. Approximately 100,000 pounds of TCE-impacted excavation materials were transported from the site and properly disposed.

Two former water supply wells are present on the property, referred to as PW-1 and PW-2. PW-1 is located on the southwest corner of the property, and PW-2 is located just outside the southwest corner of the plant.

1.2 PREVIOUS INVESTIGATIONS AND REMEDIATION ACTIVITIES

1.2.1 Physiography and Geology

Information on the physiographic and geologic setting of Western Kentucky is summarized in The Geology of Kentucky (McDowell, 1986). Physiographically, the City of Leitchfield lies on the boundary of the Western Coal Field province to the southwest, which is underlain by primarily clastic rocks (shales and sandstones) of Pennsylvanian age, and the Mississippian Plateau province to the north and east, which is underlain by older, primarily carbonate rocks (limestones and dolomites) of Mississippian age. This area is part of a regional syncline (or downward fold), in which the younger Pennsylvanian rocks have been left in the center and eroded around the edges to expose older Mississippian rocks. As a result, the Mississippian Plateau wraps around the Western Coal Field in the shape of a horseshoe. In Leitchfield, the older Mississippian carbonate rocks occur to the north-northeast, and the Pennsylvanian rocks to the south. Although the massive limestone formations of Mississippian age have little primary permeability, they are susceptible to dissolution in the presence of circulating freshwater, and have developed

solution features (karst terrain) throughout the Mississippian Plateau region where they occur close to the surface.

Structurally, the whole area lies within the Illinois Basin, a major structural downwarp in the eastern midcontinental United States that extends southwestward through Western Kentucky. This part of the basin is crossed by a series of fault systems that converge in far western Kentucky, southern Illinois and Missouri, where the Illinois Basin meets the Mississippi Embayment, a fault-bounded rift zone extending southwest to the Mississippi delta. Two major fault systems run east-west across the Western Coal field province: the Pennyrile fault system to the south, and the Rough Creek fault system in the area of Leitchfield. The Rough Creek fault system is made up of numerous high-angle normal faults, and less common reverse faults. The total displacement of the faults (downward to the south) has been generally about 300 feet vertically. Most of this displacement is interpreted to have occurred at the end of the Paleozoic era.

The Rough Creek fault system runs west-northwest to east-southeast immediately south of the site and under the City of Leitchfield. The closest mapped fault, which runs just south of the site, and through the southern portion of the adjacent Campbell Hausfeld property, is aligned with the topographic divide. According to Dames & Moore (1997, in: Haley & Aldrich, 2005), this fault has a vertical displacement of 80 to 100 feet (upward on the south side, downward on the north side). Older Mississippian rocks (the Hardinsburg Limestone, and the Haney Limestone and Big Clifty Sandstone members of the Golconda Formation) lie near the surface south of the fault, and younger Mississippian rocks (Glen Dean Limestone and Leitchfield Formation) occur to the north.

The major geologic units in the area of the site (north of the fault), are summarized from the Geologic Map of the Leitchfield Quadrangle, Grayson County, Kentucky (Gildersleeve, 1978). Based on the information available in that source document, on the north side of the fault, the Glen Dean (limestone and shale) extends to a depth of about 30 feet below ground surface (bgs), and is underlain by interbedded sandstone, shale and limestone of the Hardinsburg sandstone and the Haney Limestone to a depth of about 100 feet bgs. The Big Clifty Sandstone (sandstone and shale) and the Girkin Formation (limestone and shale) occur between depths of about 100 and 300 feet bgs. The massive Mississippian limestones of the Ste. Genevieve and St. Louis formations extend below a depth of about 300 feet bgs to at least 450 feet bgs.

1.2.2 Groundwater

Essentially, the formations in the top 100 feet of the subsurface have little primary permeability and typically yield little to no water to wells. The subsurface formations having the greatest potential for groundwater yield are the Big Clifty sandstone, and the deeper Ste. Genevieve and St. Louis limestones. The moderately permeable Big Clifty Sandstone and Girkin Formations occur between depths of about 100 and 300 feet bgs. The massive Mississippian limestones of the Ste. Genevieve and St. Louis formations, the formations with the greatest potential groundwater yield (depending on the presence of solution channels) extend below this depth to at least 450 feet bgs.

Water obtained from most drilled wells in this area of Kentucky is considered hard. Sodium chloride (common salt) and hydrogen sulfide are the two naturally occurring constituents most often encountered in objectionable amounts in groundwater. Generally, the probability of encountering these constituents increases with depth. Water having

total dissolved solids (TDS) concentrations above 1,000 parts per million (ppm) is considered saline. In Grayson County, the fresh-saline interface (i.e., the transition from fresh groundwater to saline water) typically ranges from elevations of 100 feet National Geodetic Vertical Gradient (NGVD) to 300 feet in the uplands (Carey and Stickney, 2005), or about 500 feet bgs in the area of the site. However, Hopkins (1966) noted that a well in central Grayson County, finished at a depth of 900 feet bgs (at an elevation of -275 feet NGVD), contained fresh water; he attributed this anomaly to deep circulation of fresh water along the Rough Creek fault system.

The Rough Creek fault system is associated with sinkholes near Short Creek (about 10 miles west-northwest of the site) and springs in the area of Grayson Springs (about four miles east-southeast of the site). In the area of the site, it appears to be associated with the headwaters of streams that flow both to the north and the south away from the fault zone, indicating it represents a zone of groundwater discharge in this area. The presence of deep, closely spaced, near-vertical faults associated with the Rough Creek fault zone, on or close to the southern portion of the site, no doubt adds complexity to the bedrock groundwater flow systems that underlie the site.

Near the surface, shallow groundwater occurs in unconsolidated soil and weathered bedrock (referred to as the shallow zone). Based on the information available from local studies, bedrock occurs at relatively shallow depths (5 to 18 feet bgs), and consists of shale interlayered with thin beds of siltstone, sandstone and limestone. The overlying unconsolidated material is weathered shale and residual silty clay soil derived from shale. Locally, groundwater occurs in perched zones within the fill on the adjacent Campbell Hausfeld property (fill zone). The depth to water in the shallow zone beneath the site varies from less than 2 to about 5 feet bgs, and generally deepens slightly going from south to north. The overall flow direction laterally in the shallow zone appears to follow the topographic gradient, and this zone would be expected to discharge into the Beaverdam Creek drainageway to the north. However, groundwater flow in this zone may also be influenced by relict structural features in the soil associated with faulting and fracturing of the underlying bedrock, and may also be influenced by manmade buried conduits, especially sewers and storm drains.

Nested monitoring wells installed on the neighboring Campbell Hausfeld property have been completed at various depths in shale bedrock, down to a maximum depth of 60 feet bgs. Reportedly, vertical gradients vary across the site, but are generally upward in the shallow zone during heavy rainfall events (Haley & Aldrich, 2005). This is consistent with the model of the area as a groundwater discharge area, where recharge during precipitation events quickly fills up the immediately available groundwater storage capacity, and groundwater discharges upward into surface drainageways.

Vertically, the thinly-interbedded shale, sandstone, and limestone rocks near the surface are underlain, and may be underdrained, by more massive and permeable deeper formations, specifically the Big Clifty sandstone (100-160 feet bgs) and the Ste. Genevieve/St. Louis limestones (below 300 feet bgs). Deep vertical fracturing associated with the Rough Creek fault system offers circulation pathways downward into those formations, and the former onsite supply wells PW-1 and PW-2 (depending on how they were constructed) may also represent vertical conduits into deeper formations.

1.2.3 Investigation and Assessment

In late 2003-early 2004, MACTEC performed a Phase I Environmental Site Assessment (ESA) of the facility as documented in MACTEC's *Report of Phase I Environmental Site Assessment, Robert Bosch Tool Corporation, Leitchfield Division – Building #1, Leitchfield, Kentucky* (AMEC Project 6690-03-9487-03), dated January 20, 2004. Based on the results of the Phase I ESA, MACTEC identified several "recognized environmental conditions (RECs)" and potential RECs.

A Phase II ESA was conducted in November 2004 to determine if historical site operations had impacted the soil and/or ground water at the site. The Phase II ESA activities included the collection of ten shallow soil samples and nine deep soil samples, the installation of four temporary monitoring wells, the collection of one water sample from the Henry Filter area, the collection of five groundwater samples, and the collection of two surface water samples. The soil and groundwater samples were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), total petroleum hydrocarbons, oil and grease (TPH-O&G) and the eight Resource Conservation and Recovery Act (RCRA) metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver). The results of the Phase II ESA were documented in MACTEC's *Report of Phase II Environmental Site Assessment, Robert Bosch Tool Corporation, Leitchfield Division Building #1, 410 Embry Drive, Leitchfield, Kentucky* (AMEC Project 6680-04-9537-01 dated January 6, 2005.

Additional Phase II ESA activities were conducted during 2007 through 2009 to further delineate the areas of concern identified in the initial Phase II ESA.

In March 2007, assessment activities included advancement of 18 direct-push technology (DPT) soil borings in two areas of the site, collection of nineteen soil samples for analysis of VOCs (all samples) and TPH-O&G (Hazardous Waste Accumulation Building only), and installation of eight permanent monitoring wells (MW-1 through MW-8) in the overburden outside the building to the southwest, west, northwest, north and northeast. The investigation activities were summarized in MACTEC's *Status Report of Additional Investigations, Robert Bosch Tool Corporation, Leitchfield Division Building #1, 410 Embry Drive, Leitchfield, Grayson County, Kentucky, Agency Interest #1579* (AMEC Project 6680-04-9537-03) dated January 25, 2008. The report concluded that two localized areas of TCE-impacted soil exist at the former Hazardous Waste Accumulation Building and the Flat Bed Grinder Area. A release of TCE to groundwater at the site was indicated, based on the widespread presence of chlorinated volatile organic compounds (CVOCs), including TCE and its degradation products, in groundwater sampled from the eight monitoring and two former supply wells.

During May and June 2008, additional investigation activities included a receptor survey consisting of a literature and regulatory database search, the advancement of 64 DPT borings including the installation of 49 temporary monitoring points in selected DPT borings, the installation of 15 permanent monitoring wells (MW-9, MW-10, MW-11A, MW-11B, MW-12A, MW-12B, and MW-13 through MW-21), and the collection of soil samples and groundwater samples. Soil and groundwater samples were field screened for chlorinated ethenes using the Color Tec method. The receptor survey did not identify any human receptors or ecological resources potentially affected by groundwater impacts at the site. Soil impacts were found primarily in the vicinity of the Henry Filter, with some lesser sources located at the Maintenance Area and the northern portion of the building.

The results of the investigation were summarized in MACTEC's *Status Report of Additional Investigations, Robert Bosch Tool Corporation, Leitchfield Division Building #1, 410 Embry Drive, Leitchfield, Grayson County, Kentucky, Agency Interest #1579* (AMEC Project 6680-04-9537-03) dated September 19, 2008.

In 2009, AMEC conducted additional assessment activities at the site. In March 2009, 15 DPT borings were advanced in the eastern and northeastern portions of the site. Soil samples were collected from the borings and temporary monitoring wells were installed. Soil and groundwater samples were field screened for chlorinated ethenes using the Color Tec method. Six groundwater samples and eight soil samples were sent to a fixed-based laboratory for analysis. Based on the Color Tec and laboratory analytical results, four mid-level groundwater monitoring wells (MW-2M, MW-5M, MW-8M and MW-13M) and three shallow monitoring wells were installed (MW-22, MW-23, and MW-24) in April 2009. Groundwater samples were collected from the newly installed monitoring wells in May 2009. MW-24, the easternmost well had no detectable concentrations of VOCs, effectively defining the eastern limits of the shallow plume. The mid-level wells had CVOC concentrations generally equal to or greater than the paired shallow well. MW-8M did not produce sufficient water to permit sampling. MW-13M and MW-2M had higher concentrations of CVOCs than shallow wells MW-13 and MW-2, indicating that the shale is a pathway for migration of contaminants.

In September and October 2009, a four-week pumping test was conducted using the former supply well PW-2 as the pumping well. The purpose of the pumping test was to evaluate the hydraulic relationship between the deep bedrock zone and the nearby shallow and mid-level wells. The vertical hydraulic gradient in the shallow zone is variable (upward and downward). However, the hydraulic gradient is consistently downward between the shallow and mid-level zones, on the order of 0.1 to 0.2. Based on water levels in the two deeper wells (PW-2 and PW-1), compared to nearby shallow wells, the gradient is also downward from the near-surface shale to deeper bedrock layers. Long-term pumping from PW-2 was conducted over four weeks at an average rate of 8.6 gpm. Of the wells monitored during the aquifer test, the only well that exhibited a probable hydraulic connection to PW-2 (although very slight) was MW-2M. The water level in this well exhibited a fluctuating decline that appeared to mimic the pumping well during the step test, but the total fluctuation was on the order of only 0.03 feet. After the pump in PW-2 was turned off, the water level in this well rose slowly (on the order of 0.10 feet over one day) until precipitation starting on October 27 caused it to rise more sharply. Based on these indications, it can be concluded that this well responds strongly to precipitation, and very slightly to pumping from the former deep supply well PW-2, located approximately 10 feet away. The overall conclusion from the pumping test is that pumping from PW-2 had a minor hydraulic influence on MW-2M, and no influence on MW-2 or the other shallow wells. Water level fluctuations observed in PW-1 were either not related to PW-2, or represented a very delayed response to pumping from that well. These results suggest that there is not a significant migration pathway from the shallow zone into the deeper zones of the aquifer.

The results of the 2009 investigations were summarized in MACTEC's *Status Report of Corrective Action Investigations, Robert Bosch Tool Corporation, Leitchfield Division Building #1, 410 Embry Drive, Leitchfield, Grayson County, Kentucky, Agency Interest #1579* (AMEC Project 6680-04-9537-04) dated June 29, 2010.

Summary of Assessment Results

Upon completion of the 2007-2010 investigations, the groundwater monitoring network currently installed at the site included:

- 30 shallow zone monitoring wells (MW-1 through MW-28), including two shallow well pairs (MW-11B/A and MW-12B/A) installed between 2007 and 2009, and four shallow zone monitoring wells (MW-25 through MW-28) installed during the remedial action pilot test conducted in 2010. The shallow zone wells are 6 to 24 feet deep, with screen lengths between 3 and 10 feet, and are generally screened across the soil-bedrock interface.

- Four mid-level wells, installed in April-May 2009. The mid-level wells are paired with corresponding shallow zone wells and are finished with 10 feet of screen at total depths between 36 to 41 feet bgs and are double-cased, with a steel outer casing sealed into bedrock down to a level at or below the bottom of the screen of the corresponding shallow well.

- Two deep former supply wells: PW-1 (an 8-inch well with a total depth of 367 feet bgs) and PW-2 (a 6-inch well with an estimated total depth of 475 feet bgs).

The soil boring locations and the water sampling locations from the previously mentioned assessment activities are shown on Figure 2. The well construction details for site monitoring and production wells are summarized in Table 1 and analytical results for the groundwater samples collected during the previous environmental investigations are included in Table 2. The following conclusions and observations are condensed from information obtained during the previous environmental investigations:

- The shallow subsurface at the site consists of silty clay overburden soils grading downward into shale bedrock with thin hard limestone and sandstone interbeds. Relatively unweathered rock is encountered at variable depths ranging from 4.5 to 18.5 feet bgs. Figure 3 shows a map of bedrock surface elevations across the site, produced from the boring logs and well construction logs generated during the investigations.

- Based on field hydraulic conductivity (slug) testing, hydraulic conductivity ranged from 0.011 to 3.7 feet/day in the shallow groundwater zone and generally increases with depth and nearness of the screen to the soil/bedrock interface. Hydraulic conductivity in the mid-level zone ranged from 0.005 to 9.0 feet/day, with MW-2M near the fault zone having the highest measured conductivity of any site monitoring well.

- The overall direction of groundwater flow in the shallow zone is to the north and northeast, in the general direction of the topographic gradient and pre-construction drainage. Figure 4 shows groundwater elevations mapped in the shallow zone during the July 2009 sampling event. A bedrock high occurs under the southeastern portion of the plant, probably representing a pre-construction topographic divide, and little to no groundwater flow occurs in this area (see Figure 3).

- Most of the flow in the shallow groundwater zone appears to occur in relatively localized zones in the vertical profile where shale partings in the rock or relict structures in the clay are relatively open. Secondary permeability (and pathways for contaminant migration) may be provided by vertical fracturing and associated troughs in the bedrock surface. The upper bedrock zone (at the soil/bedrock interface) appears to be somewhat more permeable than the overlying silty clay soil, and to offer the primary pathway for lateral groundwater flow and contaminant migration in the shallow groundwater zone. An additional pathway may also occur approximately 40 feet bgs at the shale/limestone interface, where the mid-level wells are screened. MW-2M and MW-13M have some of the highest hydraulic conductivities calculated at the site and the strong, rapid response of MW-2M to precipitation events shows a strong connection to recharge features in and around the upgradient fault zone.

- The source area for TCE impacts, under the west central portion of the plant, appears to be associated with materials handling processes in the area of the former degreaser (on the north side of the Henry Filter pit), and just outside the original building, which ended just south of the plating room.

- CVOC impacts in shallow groundwater are widespread across the site, both horizontally and vertically. The highest groundwater concentrations, greater than 100 milligrams per liter (mg/L), are associated with the soil source area identified under the west-central portion of the plant, in the area of the former degreaser (north side of the Henry Filter pit) and the south wall of the original plant. CVOCs have been detected in both the deep former supply wells (PW-1 and PW-2). The presence of CVOCs in the deep wells may have resulted from deep fracturing in combination with a downward vertical gradient, or possibly from incomplete sealing of the former supply well casings, which may have acted as conduits for downward migration from the shallow zone. Table 2 provides a summary of all groundwater monitoring well analytical results obtained from the assessment activities. Figure 5 shows the distribution of CVOCs in shallow groundwater from the most recent site-wide sampling event in May 2009. Figure 6 shows a geologic cross-section of the site with the possible pathway through the fault zone to the deep wells, PW-1 and PW-2.

- The constituents of concern (COCs) in groundwater identified on the basis of the cumulative analytical data concentrations and frequency of detections above groundwater screening levels are the CVOCs TCE, cis-1,2-dichloroethene (cis-1,2-DCE), 1,1-dichloroethene (1,1-DCE) and vinyl chloride (VC). The presence of TCE degradation products in the plume, which generally increase as a percent of total CVOCs with distance from the source area, indicates reductive dechlorination (natural attenuation) is occurring.

- Site conditions favor corrective actions focusing on groundwater rather than soil, due to the presence of higher concentrations of CVOCs in groundwater than in soil.

1.2.4 Remedial Alternatives Evaluation

In August 2008, in conjunction with the review of the Status Report of Additional Investigations (MACTEC, 2008), MACTEC performed a preliminary evaluation of potential remedial alternatives, on behalf of RBTC. The previous site assessment activities had not completely delineated the horizontal and vertical extent of contamination; however, it was deemed beneficial to proceed to address the known groundwater contamination in the overburden to prevent further contribution to the overall plume. Included in the evaluation were in-situ application of nanoscale iron powder, in-situ application of emulsified zero-valent iron (EZVI), in-situ application of Trap and Treat BOS 100®, in-situ air sparging with soil vapor extraction (AS-SVE), dual-phase extraction (DPE), and biostimulation.

Based on the results of the preliminary evaluation, including technical effectiveness and cost, two of these corrective measures alternatives were selected for pilot testing – biostimulation and Trap and Treat BOS 100®. MACTEC prepared and submitted a *Remedial Action Pilot Work Plan, Robert Bosch Tool Corporation, Leitchfield Division Building #1, 410 Embry Drive, Leitchfield, Kentucky, Agency Interest #1579* (AMEC Project 6680-04-9537-05) to the KDEP on August 17, 2009. The Remedial Action Pilot Work Plan was approved by the KDEP, Division of Waste Management, Hazardous Waste Branch by letter dated September 4, 2009.

1.2.5 Pilot Testing

Pilot testing of the proposed remedies was performed between January and June 2010. Four pilot test areas were selected to test the relative effectiveness of Trap and Treat BOS 100® and biostimulation in both the source area (CVOC concentrations exceeding 50 mg/L) and the dilute plume area (CVOC concentrations between 1 and 10 mg/L).

The results of the pilot study were documented in MACTEC's *Remedial Action Pilot Test Report, Robert Bosch Tool Corporation, Leitchfield Division Building #1, 410 Embry Drive, Leitchfield, Kentucky* (AMEC Project 6680-04-9537-05) submitted to the KDEP, Division of Waste Management, Hazardous Waste Branch on October 6, 2010.

The pilot study concluded that biostimulation was shown to be feasible for degrading CVOCs in the dilute plume; however, the large injection volumes used with the sodium lactate solution noticeably displaced or mobilized contamination in the source area. Additionally, pilot monitoring indicated that the amendment injected in the plume area, near MW-4, was depleted and no longer able to promote dechlorination by the end of the monitoring period. The full-scale use of biostimulation should therefore use a lower-volume, longer-lasting amendment. Biostimulation was not considered to be feasible for the source area based on the failure to achieve reducing conditions.

The pilot study also concluded that Trap and Treat BOS 100® would be effective in the source area, both sequestering and degrading the high-concentrations of CVOCs in the vicinity of the Henry Filter pit. The Trap and Treat BOS 100® would also be effective in the dilute plume. Because permeability in the overburden has been observed to increase at the interface with the underlying shale, injections should be biased to place more Trap and Treat BOS 100® at and into the weathered surface at the top of shale. Additionally, the pilot testing showed strong evidence that the excavation around the Henry Filter pit acts as a collection and mixing area for flows passing through the clay overburden and possibly the top of shale as well. Since these disturbed soils serve as a node in local

preferential flow pathways, the injection pattern and dosing will be adjusted to ensure an adequate quantity of Trap and Treat BOS 100® is placed around the sides and bottom of the filter pit. Additional injection points may be placed through the bottom of the filter pit as needed.

1.3 SCOPE AND PURPOSE OF WORK PLAN

This Remedial Action Work Plan (RAWP) has been prepared for submittal to the Kentucky Division of Waste Management (KDWM), Superfund Branch to address corrective action activities proposed for shallow zone groundwater at the referenced facility. The purpose of the RAWP is to identify a scope of work, implementation and monitoring plan, and estimated schedule for treatment of CVOCs in groundwater, concurrently with continued assessment work at the site. Selection of additional remedial measures for enhancements of this shallow zone remediation, if needed, will be based on the results of the post-injection monitoring described herein, as well as the results of the additional assessment work.

This RAWP includes selection of treatment application areas, implementation procedures, and monitoring of treatment effectiveness.

1.4 ORGANIZATION

This RAWP is designed to provide a stepwise approach for implementing the selected remedial alternatives for shallow zone groundwater treatment. The RAWP is divided into six sections. Section 1.0 provides an introduction to the site, a summary of previous environmental investigations and pilot testing, the general scope and purpose, summary of the RAWP organization, and RAWP Guidance Documents. Section 2.0 includes a statement of the RAWP objectives, an implementation strategy, a summary of site health and safety documentation and procedures, and reference to quality control measures. Section 3.0 presents the implementation procedures and scope of work for remediation of groundwater. Section 4.0 provides a brief description of the contents included in the proposed Remedial Action Implementation Report. Section 5.0 provides for an estimated schedule for conducting the identified scope of work. Section 6.0 provides additional references used in the completion of this Work Plan.

1.5 GUIDANCE DOCUMENTS

This RAWP has been prepared using the following documents for guidance:

- Kentucky Division of Waste Management (KDWM), January 8, 2004, "Kentucky Guidance for Ambient Background Assessment."
- KDWM, January 15, 2004, "Kentucky Guidance for Groundwater Assessment Screening."
- United States Environmental Protection Agency (USEPA), June 2011, "Regional Screening Levels."
- Parsons Corporation, August 2004, "Principles and Practices of Enhanced Anaerobic Bioremediation of Chlorinated Solvents."

- Parsons Engineering Science, August 1998, "Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water."

- USEPA, Office of Solid Waste and Emergency Response, 1998, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, 3rd Editions, Final Update III, SW-846."

2.0 STATEMENT OF WORK

The following section presents the objectives, general strategy, safety procedures, and quality assurance plan for remedial action.

2.1 OBJECTIVES OF REMEDIAL ACTION

In general, the objectives of this remedial action work plan are to:

- Prevent migration of high-concentration CVOCs from the source area, near the Henry Filter Pit, into surrounding groundwater;
- Promote degradation of the shallow zone CVOC plume outside of the source area by promoting "mixed behavior" with a series of injection barriers (mixed behavior involves creation of varying zones of aerobic and anaerobic conditions across the site, allowing for multiple degradation pathways including dechlorination, co-metabolism, and oxidation);
- Identify preferential migration pathways in the overburden and upper shale during implementation and optimize the placement of injection points and amendments to intercept them;
- Monitor the treated area and document the response to biostimulation to determine suitable reinjection intervals and estimate the time required to achieve groundwater remediation goals;
- Prepare a written report documenting the field activities, the results obtained, and providing AMEC's conclusions and recommendations for additional remediation enhancements. Figures, tables, and photographs necessary to describe the work performed and to support the conclusions and recommendations will be included.

2.2 GENERAL IMPLEMENTATION STRATEGY

This section summarizes the basis for the RAWP development. The strategy proposed for this project addresses full-scale implementation of groundwater treatment in the shallow zone using two technologies, biostimulation using Regenesis 3DMe (3DMe) and chemical adsorption and reduction using Trap and Treat BOS 100®. Full-scale treatment areas are shown on the site map in Figure 7.

The sequence of implementation will be injection of Trap and Treat BOS 100® in the source area, followed by injection of the 3DMe in the surrounding plume. Direct contact between the Trap and Treat BOS 100® and 3DMe will load the carbon component of the Trap and Treat BOS 100® with amendment hydrocarbons, rendering it unable to sorb CVOCs, as intended. To minimize this condition, a buffer distance of approximately 20 feet has been maintained between the nearest Trap and Treat BOS 100® and 3DMe injection points. In addition, sentinel wells at the perimeter of the Trap and Treat BOS 100® treatment area will be monitored during fracturing and injection of the nearby 3DMe points. If influence is indicated by a rise in groundwater elevation or an increase in specific conductance in the sentinel well, the 3DMe point will be injected with a reduced

volume of amendment, relocated to a greater distance, or abandoned and not used, depending on the severity of the indicated cross-connection.

Investigative derived waste (IDW) consisting of drill cuttings, development water, purge water, and decontamination fluids will be containerized and characterized for appropriate disposal.

A written report will be prepared to document the remediation activities performed at the site and provide a detailed summary of remediation activities and the response of the aquifer to the full-scale treatment efforts. AMEC's conclusions and recommendations regarding any enhancements to the remedial action will also be provided in the report.

2.2.1 Pre-Injection Investigation

The remedies described in this plan address CVOC contamination in the shallow zone. Prior to injection, macro-core samples or dual tube samples will be collected and examined at various locations in the Trap and Treat BOS 100® treatment area to identify preferential pathways in the clay and the upper weathered shale and to screen for CVOC concentration profiles with depth. Cores will be collected in the previously-injected pilot treatment area near MW-25, adjacent to the Henry Filter pit, near MW-12B/A, and near MW-27. The cores from the pilot area will help verify the Trap and Treat BOS 100® distribution pattern achieved with the pilot injections. Of interest is the thickness of the Trap and Treat BOS 100® layer created during the pilot study, the radius of distribution, and whether fractures were created near the top of shale or a higher elevation. Additional cores may also be collected and examined after the initial full-scale injections to provide confirmation that distribution is occurring at the desired depths and radius. This will permit adjustment of point spacing and injection techniques to improve results in subsequent injection points.

2.2.2 Trap-and-Treat BOS 100®

Trap and Treat BOS 100® treatment will involve injecting a slurry of iron-impregnated activated carbon into the source area groundwater matrix. Trap and Treat BOS 100® "traps" groundwater VOCs by adsorption onto the carbon granules and holds the contaminants in close proximity to the impregnated zero-valent iron to be "treated" by chemical reduction. TCE is sequentially dechlorinated to ethene as the iron is oxidized and the CVOCs are reduced. The proposed locations of the Trap and Treat BOS 100® injection points are indicated on Figure 7. The source area treatment will receive 70 multi-level "overburden" injection points placed at approximately 10-foot intervals (shown in red) and 55 "shale" injection points (shown in orange), located between the overburden points. A North-South cross section showing the source area Trap and Treat BOS 100® treatment area is presented on Figure 8.

Based on groundwater concentrations, the most significant releases were near the Henry Filter pit and the previous south end of the building, near MW-25. Since the disturbed soil around the pit is presumably more permeable than the surrounding matrix, shallow groundwater will flow more easily around the pit than in the surrounding soils. Success of the source area treatment requires placing the Trap and Treat BOS 100® material to intersect the flow paths of the most highly-contaminated groundwater. Figure 9 shows a North-South and an East-West cross section of the shallow zone in the Trap and Treat BOS 100® treatment area, including the Henry Filter Pit. The pit is approximately 10 feet

deep and the bottom of the pit approaches the top of shale elevation at the eastern edge. Placement of Trap and Treat BOS 100® around the sides and bottom of the pit will intercept this preferential flow and presents possibly the best opportunity for CVOC mass removal. The room to the north of the pit previously contained compressors and air handling equipment, most of which have been moved. Additional relocation of equipment or adjustment of the grid may be performed in order to access this area and perform the necessary drilling and injection. If this is not completely possible, the next best course is to install the injection points as a downgradient barrier between MW-27 and MW-5.

Post-injection monitoring will be performed as shown in Table 3 and in conjunction with the biostimulation monitoring. Treatment success would be indicated by reductions at MW-11B/A, MW-26, and MW-27 similar to or greater than achieved in the pilot at MW-25.

2.2.3 Biostimulation

The biostimulation component will treat groundwater in the shallow CVOC plume area (outside the concentrated source, total CVOC concentrations below 100 mg/L). Biostimulation will involve injecting Regenesis 3DMe (a multi-component amendment containing both quick-release and slow-release components) into eight rows of injection points and permanent injection wells. The proposed locations of the biostimulation injection wells are indicated on Figure 7. Eight rows of temporary injection points and permanent injection wells are designed to produce a sequence of anaerobic and aerobic treatment zones in the shallow aquifer to take advantage of multiple CVOC degradation pathways inherent in "mixed behavior." This provides flexibility to optimize the treatment, depending on the response of the aquifer geochemical conditions and CVOC concentration trends. The spacing of the injection points and rows has been selected to obtain consistent reducing conditions along the length of the row, while permitting aerobic, oxidizing conditions to persist in the intervals between rows and aerobic co-metabolism in the transitional areas between aerobic and anaerobic zones.

Within the anaerobic zone along the injection rows, metabolism of the injected substrate by aerobic and anaerobic bacteria will deplete dissolved oxygen (DO) and reduce oxidized inorganics in the matrix (e.g., sulfates, nitrates, etc.). A low DO concentration will be maintained to encourage reductive dechlorination. The goal is to produce conditions where the desired dehalococcoides (DHC) chloro-respiring bacteria populations necessary for the reductive dechlorination of TCE can favorably compete with other organisms (i.e., available hydrocarbon source, DO < 1 mg/L, oxidation reduction potential [ORP] of 0 to -225 millivolts [mV] and pH > 5.0 standard units [su]).

In the aerobic region between the injection rows, aerobic bacteria will be able to degrade cis-1,2-DCE and vinyl chloride, which may accumulate from incomplete reduction of TCE in the anaerobic zones. Vinyl chloride can be directly oxidized if there is adequate dissolved oxygen present. Cis-1,2-DCE is usually degraded by cometabolism, requiring both the presence of dissolved oxygen and dissolved hydrocarbons, which will be supplied by breakdown products from the amendments migrating outward from the anaerobic zones. Cometabolism will be most likely in the fringes adjacent to anaerobic zones, while direct oxidation will prevail in the most highly aerobic zones farther downgradient from the injection rows.

At the periphery of the shallow plume (CVOC concentrations below 1 mg/L), only temporary injection points are used because the probability is high that a single injection

will suffice to achieve CVOC concentration goals. Injection points in groundwater with CVOC concentrations between 1 and 10 mg/L will be mainly temporary points; however, several strategically located points will be converted to permanent injection wells to allow future injections of additional amendments and bio-augmentation cultures. Where groundwater concentrations exceed 10 mg/L, all injection points will be installed as permanent wells, since the necessity for re-injection in these locations is highly likely. A North-South cross section showing the biostimulation treatment area is presented on Figure 8.

The response to the injections will be monitored for approximately 90 days to determine whether reducing conditions are achieved and whether dechlorination is converting TCE (the primary COC) to cis-1,2-DCE, VC, and ethene. Table 3 provides the monitoring locations, sequence of monitoring events, and the parameters included. Monitoring may indicate several possible conditions and different conditions may exist in different portions of the plume.

1. Persistent Aerobic Conditions. This indicates that the amendment has either been depleted without consuming the available DO or the bacterial populations have not multiplied sufficiently to consume the amendment. Low residual total organic carbon (TOC) concentrations indicate the former condition, requiring additional injection of 3DMe. High TOC in conjunction with high DO, nitrate, and sulfate, indicates inadequate biological activity. Either additional time can be allowed for native populations to multiply or bio-augmentation cultures can be injected to speed the process.

2. Mixed Aerobic and Anaerobic Conditions. This is the preferred design condition, providing for dechlorination, cometabolism, and aerobic oxidation at varying distances from the injection rows. Monitoring will continue until either depletion of amendments is indicated or treatment goals are achieved.

3. Widespread Anaerobic Conditions with Buildup of Breakdown Products. In this condition, TCE concentrations will decline, but cis-1,2-DCE and vinyl chloride will accumulate and persist. This indicates that native bacterial populations are not capable of complete dechlorination and wider propagation of the anaerobic zones has prevented aerobic cometabolism and direct oxidation. Potential responses include:

    - Injection of bio-augmentation cultures to permit complete dechlorination. This would be preferred where TCE concentrations remain above the USEPA maximum contaminant levels (MCLs) and is a possible solution for cis-1,2-DCE accumulations.

    - Injection of oxidant to re-establish aerobic conditions. This would be the preferred response where the primary COC is vinyl chloride. A dilute solution of hydrogen peroxide would re-establish aerobic conditions and permit degradation of VC and, if sufficient TOC remains, to support cometabolism of cis-1,2-DCE.

- Alternating aerobic and anaerobic rows. Replenish 3DMe as needed to maintain anaerobic conditions in rows 3, 5, and 7 while adding peroxide to rows 2, 4, 6, and 8 to prevent VC migration.

2.3 HEALTH AND SAFETY PLAN PREPARATION

The existing Health and Safety Plan (HASP) prepared for the project will be updated and expanded to include the additional hazards and work procedures required for the shallow-zone groundwater remediation. The updated HASP will include chemical and material handling, remediation drilling techniques, amendment injection procedures, spill response and emergency procedures. The HASP will be developed in accordance with Occupational Safety and Health Administration (OSHA) requirements (29 CFR 1910.120) and will be reviewed and signed by all individuals (AMEC personnel and other) present at the site for the purpose of remediation and monitoring activities.

3.0 REMEDIAL ACTION PROCEDURES

This RAWP provides for implementation of selected remedial technologies for the treatment of chemically-affected soil and groundwater at the subject site. The scope of work presented in this RAWP is based on the strategy presented in Section 2.2. The identified scope of work includes installation of additional monitoring wells, permanent injection wells, temporary injection points, injection of treatment amendments, and monitoring of remediation effectiveness. Specifics, regarding work items for this project, are described in the following sections.

3.1 UNDERGROUND INJECTION CONTROL CONSIDERATIONS

Class V Aquifer Remediation Well (ARW) notifications will be required for both the permanent injection wells and the direct-push injection points in accordance with Underground Injection Control (UIC) regulations (40 CFR 144). Performance of this remedial action will involve injection of fluids into a surficial aquifer through Class V underground injection control wells. UIC notification will be submitted under separate cover to the USEPA Region IV office in Atlanta, Georgia. Following injection, pH, chloride, and total dissolved solids (TDS) may temporarily exceed secondary drinking water standards. It is expected that the pH, chloride, and TDS will return to naturally-occurring background values within 365 days from final injection.

3.2 PRE-REMEDIATION INVESTIGATION

Prior to injection, macro-core or dual tube samples will be collected and examined at a minimum of three locations in the Trap and Treat BOS 100® treatment area and three locations in the pilot Trap and Treat BOS 100® injection grid. Selecting points to be used as injection locations, continuous DPT samples will be collected from the ground surface to the depth of refusal. The pilot area cores will be examined and the elevation and thickness of Trap and Treat BOS 100® layers will be noted. Trap and Treat BOS 100® layers may cause incomplete sample recovery, in which case the thickness will be undetermined. The injection area cores will be examined for partings, sand seams, or other potential indications of strata that may be more transmissive. The estimated depth at which these features occur will be recorded. At least one segment from a core collected near the Henry Filter pit will be field-screened for CVOCs using Color Tec and selected samples will be analyzed by EPA Method 8260B for VOCs. If only one sample is selected, the bottom segment of the core will be screened. At least one core from an overburden point location adjacent to a proposed shale injection well will be collected. The core will be examined as described for the pilot area core above.

3.3 TRAP AND TREAT BOS 100® INJECTION

3.3.1 Direct-Push Drilling for Trap and Treat BOS 100®

A total of approximately 125 DPT borings will be advanced using 1.5-inch to 2.5-inch drill rods to perform the Trap and Treat BOS 100® direct injection. The initial approach specifies that approximately 70 of these will be designated as "overburden" injection points and 55 designated as "shale" injection points. However, based on the results of the core investigation and results of initial injections, point spacing and quantities injected at each interval may be adjusted in the field as needed. Drilling locations for the Trap and

Treat BOS 100® injection points are shown on Figure 7. Figure 9 shows two cross sections through the source area with the approximate top-of-shale elevations shown.

The "shale" injections will be performed first to allow the deeper fractures to form in and immediately above the upper weathered shale without losing pressure through the higher "overburden" fractures. Each borehole will be predrilled approximately 1-2 feet into the shale using an auger slightly smaller than the DPT rod used for injection (1-7/8" to 2-1/4" auger for a 2.5-inch rod). Then a DPT rod and injection point will be driven to refusal through the boring. A single injection into the upper shale will be performed at each boring. The "overburden" injection points will be driven to refusal at the top of weathered bedrock, at approximately 12 to 18 feet bgs, with multiple injections performed at approximately 2-foot intervals. Injection of the Trap and Treat BOS 100® slurry is described in Section 3.3.2.

If initial injections show that the formation will not accept the required volumes of Trap and Treat BOS 100®, additional top-down injection intervals may be added into the overburden at the "shale" injection locations or the entire grid may be converted to combined overburden and top-of-shale points, as required.

3.3.2 Trap and Treat BOS 100® Injection

Trap and Treat BOS 100® will be directly injected into each of the 125 DPT borings described in Section 3.1.2 and shown on Figure 7. Trap and Treat BOS 100® product information is provided in Appendix B. A total of 16,380 lbs of Trap and Treat BOS 100® (78 full drums) will be required for injections. Appendix C provides calculations of Trap and Treat BOS 100® requirements. Since Trap and Treat BOS 100® removes CVOCs both by carbon adsorption and by chemical reduction, the calculated dosage considers both the application of sufficient iron to reduce the contaminants in the long term and sufficient carbon to reduce groundwater contaminant concentrations in the short term. Each overburden injection point will be injected at three to four intervals, spaced approximately two feet apart vertically. Each "overburden" boring will receive approximately 175 lbs of Trap and Treat BOS 100® and 250 gallons of water, or 50 lbs of Trap and Treat BOS 100® and 70 gallons of water at each of three or four vertical intervals. Each "shale" boring will be injected at a single interval in the upper shale with 75 lbs of Trap and Treat BOS 100® and 105 gallons of water. A typical injection profile is provided on Figure 10.

The Trap and Treat BOS 100® will be mixed with water in an agitated tank to form a slurry and injected using a positive displacement pump. Fluid discharge from the pump is connected directly to the DPT rods for injection into the aquifer matrix. The DPT rods will be equipped with expendable drive points that permit injection at multiple levels during the same push. The positive-displacement injection pump has a dead-head pressure capability in excess of 1,000 pounds per square inch (psi); however, because of the shallow depth of the injections, peak pressures are expected to be significantly lower when fracturing of the matrix occurs. During pilot injections, pressures required were typically below 200 psi and the highest pressures were below 400 psi. Injection will initially proceed in a top-down manner at the aforementioned two-foot intervals from the top of the water table to refusal. In this manner, new injections are least likely to follow the pathways already opened by fracturing of the previous interval. If problems are encountered with fluid leakage or "surfacing," the injection method may be changed to a "bottom-up" sequence.

3.4 BIOSTIMULATION

3.4.1 3DMe Injection by Direct-Push Drilling

A total of 167 DPT borings will be advanced to perform amendment injection for the plume remediation. A total of 124 of these are temporary injection points and will be abandoned by grouting upon completion. The remaining 43 injection points will be converted to permanent injection wells after completion of the DPT fracturing and injections. The DPT boring locations are shown on Figure 7 and are nominally situated at 15-foot intervals on rows spaced approximately 60 feet apart. If the design volumes cannot be injected at these intervals, additional points may be necessary.

As the DPT borings are advanced, injections will be performed to enhance the formation permeability by propagating fractures through application of injectate under pressure. As the drill rod is advanced, a 3DMe solution (10 parts water to 1 part 3DMe) will be injected at three to five intervals, spaced approximately two feet apart vertically from one foot below the top of groundwater to refusal. 3DMe product information is provided in Appendix B. The 26 injection points located inside the 10 mg/L total VOC isopleth will receive 330 gallons of solution, while the remaining 141 points will receive 220 gallons of solution each. A total of 3,600 gallons of concentrate and 36,000 gallons of dilution water will be required. Appendix D provides calculations of 3DMe requirements. The solution will be injected using a positive displacement pump. Fluid discharge from the pump is connected directly to the DPT rods for injection into the matrix. The DPT rods will be equipped with slotted, retractable drive points that permit injection at multiple levels during the same push. The positive-displacement injection pump has a dead-head pressure capability in excess of 1,000 pounds per square inch (psi); however, because of the shallow depth of the injections, peak pressures are expected to be much lower when fracturing of the matrix occurs. Injection will proceed in a top-down manner at the aforementioned two-foot intervals from the top of the water table to refusal.

At the termination depth of each boring and following injection, DPT rods at temporary injection points will be extracted and the holes will be grouted to the surface with a bentonite cement grout. Permanent injection wells will be installed in the borings designated on Figure 7 as permanent. A detail of the permanent well installation is provided on Figure 11. The permanent injection wells will consist of 3/4-inch ID Schedule 40 PVC flush-threaded riser pipe with the bottom section consisting of 10 feet of 0.010-inch machine slotted PVC screen. The screened interval will be approximately 5 to 15 feet bgs. Total depth will vary, but is expected to average near 15 feet bgs. A #20-40 sieve silica sand pack will be installed to one foot above the top of screen, followed by a #30-65 fine sand seal and cement-bentonite grout to the ground surface. Potable water will be added to hydrate the seal and it will be allowed to sit overnight. A prepack well screen may be substituted for the screen and sand pack described above. The well risers will terminate approximately 2 to 4 inches below the ground or floor surface and be completed with an 8-inch steel cover, as shown.

3.4.2 Bioaugmentation

Polymerase chain reaction (PCR) analyses during pilot testing showed some native populations of DHC are present. However, if remediation monitoring indicates that reducing conditions are achieved (ORP less than -50mV and DO less than 1 mg/L), but concentrations of TCE or its daughter products does not decline significantly,

bioaugmentation can be implemented to speed the CVOC degradation rate. Cultures of bacterial consortia, containing DHC are available from two sources; Biodechlor Inoculum (available through Regenesis) and BAC-9 (available through EOS Remediation, LLC).

3.5 INVESTIGATIVE DERIVED WASTE

Investigative derived waste (IDW) consisting of the following media will be containerized in 55-gallon drums and staged on the site pending waste characterization:

- Drill cuttings generated during the drilling process.
- Development water generated during well installation activities.
- Purge water generated during groundwater sampling activities.
- Decontamination fluids generated during decontamination activities.

3.6 MONITORING PROGRAM

Groundwater remediation performance monitoring parameters and sampling intervals are summarized on Table 3.

3.6.1 Monitoring Well Purging and Sampling

Monitoring wells will be purged prior to sample collection to remove any stagnant water from the well so that the samples collected will be representative of the groundwater quality in the vicinity of each well. Sampling methods may vary but will include either low flow or traditional methods. During either sampling method, to determine when a well has been adequately purged, specific conductance, DO, ORP, pH, water temperature, and turbidity will be measured periodically during well evacuation using instruments which will be calibrated daily and the volume of water removed will be observed and recorded. The wells will be considered adequately purged when the pH, specific conductance, temperature, and turbidity of the groundwater have stabilized. Wells that evacuate to dryness or cannot maintain a stable water level with less than a 50 milliliter/minute pumping rate will be sampled as soon as the well has recovered enough to yield sufficient volume for a sample. For wells that do not stabilize after an hour of low flow purging, the samples will be collected at that point in time.

The monitoring wells will be purged using either a low-flow electric pump or peristaltic pump. The pump or pump inlet tubing will be lowered to approximately the midpoint of the well screen. Well soundings to verify total depth of the wells and detect sediment accumulation will be performed after all water sampling is complete in order to avoid excessive turbidity. The low flow pump will be removed from the well and groundwater samples will be collected with a new disposable polyethylene bailer attached to a new length of polypropylene rope. Depending upon the type of low-flow pump used, the groundwater samples may be collected using the low-flow pump. The low-flow pump will be decontaminated between wells using de-ionized water, Alconox, and isopropyl alcohol.

3.6.2 Baseline Monitoring

Prior to implementing the injections, groundwater elevations will be obtained from all site monitoring wells. A full round of groundwater samples will be collected from all onsite monitoring wells and analyzed for VOCs using USEPA Method 8260B. Additionally, field parameters of pH, ORP, DO, temperature, and specific conductance will be obtained from

all monitoring wells. The groundwater samples from monitoring wells MW-5, MW-9, MW-13, and MW-22 will also be analyzed for methane, ethane, and ethene by USEPA Method RSK 175, chloride by USEPA Method 325.2, total dissolved solids (TDS) by USEPA Method 160.1, and nitrate and sulfate by IC Method E300. A status report of the baseline monitoring will be submitted to KDWM approximately 45 days following receipt of laboratory reports. If timing is advantageous, these may be included in combined reports with concurrent investigation results.

3.6.3 Remediation Effectiveness Monitoring

Following completion of the injections, monitoring will be performed to determine the effectiveness of the selected technologies in the source and plume areas.

Biostimulation monitoring wells MW-4, MW-5, MW-7, MW-13, MW-13-M, and MW-22 will be monitored monthly for three months to obtain groundwater elevations and field parameters of pH, ORP, DO, temperature, and specific conductance. Approximately 90 days following injection, groundwater samples will be collected from the biostimulation monitoring wells and analyzed for VOCs using USEPA Method 8260B, methane, ethane, and ethene using USEPA Method RSK 175, chloride using USEPA Method 325.2, TDS using USEPA Method 160.1, and nitrate and sulfate using IC Method E300. Following collection of the groundwater samples, a Microbial Insights Bio-Trap sampler will be inserted into MW-4 and MW-13. The samplers will be suspended in the wells (inserted during the 60-day monitoring event) for 30 days to accumulate bacterial cultures and removed at the time of the 90-day post-injection groundwater sampling. The Bio-Traps will be analyzed by PCR techniques for DHC populations and activity. Additional VOC analyses and field parameter measurement events will be conducted quarterly during the first year and semi-annually thereafter, as shown in Table 3. Data collected during these events will be used to determine when depletion of the injected amendments is occurring and whether bio-augmentation is necessary.

Groundwater elevations will be obtained from the Trap and Treat BOS 100® monitoring wells (MW-11A, MW-11B, MW-12A, MW-12B, and MW-27) monthly for three months following injection. At intervals of monthly for three months following the completion of the pilot injections, groundwater samples will be collected from the Trap and Treat BOS 100® monitoring wells and analyzed for VOCs by USEPA Method 8260B. This sampling will allow observation of the initial sorption of contaminants and provide sufficient data to evaluate any potential concentration rebound.

Approximately 90 days following the completion of the Trap and Treat BOS 100® injection, groundwater samples will be collected from all of the Trap and Treat BOS 100® monitoring wells and analyzed for VOCs by USEPA Method 8260B, iron by USEPA Method 6010B and chloride by USEPA Method 325.2.

A status report of the first quarter remediation effectiveness monitoring will be submitted to KDWM approximately 135 days following the injections. Additional status reports will follow each quarterly and semi-annual monitoring event.

4.0 REMEDIATION IMPLEMENTATION REPORT

A Remediation Implementation Report will be prepared following completion of the injections and first quarter post-injection monitoring. Results of chemical laboratory analyses of samples will be presented in tabular and graphical form. Laboratory data, quantities of remediation amendments applied, field sampling forms, well development records, and well installation diagrams will be maintained during field assessment activities, and will also be provided as appendices of the implementation report.

The report will evaluate and interpret geochemical conditions and contaminant concentration trends before and after treatment. A technical judgment will be made regarding the aquifer response to treatment, and indications of future potential for optimization. The report will include a recommendation for ongoing monitoring and any needed follow-up.

Additional status reports will be submitted approximately 45 days after each quarterly, semi-annual, and annual monitoring event enumerated in Table 3. Results of chemical laboratory analyses of samples will be presented in tabular form. Laboratory data and field sampling forms will be provided as appendices of the reports.

5.0 ESTIMATED SCHEDULE

The RAWP can be initiated shortly following KDWM approval. Following approval, arrangements for drilling and remediation subcontractors can begin. Mobilization to the site to perform the remediation tasks should be completed within eight weeks of RAWP approval. Drilling, well installation, and injection activities should be completed in approximately six weeks. Monthly field parameter monitoring will proceed for approximately 12 weeks after injection with remediation effectiveness monitoring performed at the end of that period. Laboratory analytical results should be available from the laboratory within two weeks from the laboratory's receipt of the samples. The Remediation Implementation Report can be submitted to KDWM within six weeks of receipt of the laboratory analytical results. The total duration of the planned remediation may be longer or shorter, depending on whether the biostimulation and Trap and Treat BOS 100® phases are performed concurrently. The entire scope of work through the first quarterly post-injection monitoring event, as described in this RAWP, is estimated to take approximately eight to nine months to complete.

The proposed post-injection groundwater monitoring schedule is summarized in Table 3. A proposed schedule which integrates both the additional assessment and remedial action activities planned for the site in 2012 is being provided under separate cover.

6.0 REFERENCES

MACTEC, 2004, Report of Phase I Environmental Site Assessment, Robert Bosch Tool Corporation, Leitchfield Division – Building #1, Leitchfield, Kentucky, AMEC Project 6690-03-9487-03, Greenville, South Carolina.

MACTEC, 2005, Report of Phase II Environmental Site Assessment, Robert Bosch Tool Corporation, Leitchfield Division Building #1, 410 Embry Drive, Leitchfield, Kentucky, AMEC Project 6680-04-9537-01, Greenville, South Carolina.

MACTEC, 2006, Additional Phase II Environmental Site Assessment Work Plan, Robert Bosch Tool Corporation, Leitchfield Division Building #1, Leitchfield, Kentucky, AMEC Project 6690-03-9487-03, Louisville, Kentucky.

MACTEC, 2008a, Status Report of Additional Phase II Environmental Site Assessment, Robert Bosch Tool Corporation, Leitchfield Division Building #1, 410 Embry Drive, Leitchfield, Kentucky, Agency Interest #1579, AMEC Project 6680-04-9537-03, Louisville, Kentucky.

MACTEC, 2008, Status Report of Additional Investigations, Robert Bosch Tool Corporation, Leitchfield Division Building #1, 410 Embry Drive, Leitchfield, Grayson County, Kentucky, Agency Interest #1579 AMEC Project 6680-04-9537-03, Louisville, Kentucky.

MACTEC, 2009. Remedial Action Pilot Work Plan, Robert Bosch Tool Corporation, Leitchfield Division Building #1, 410 Embry Drive, Leitchfield, Kentucky, Agency Interest #1579, AMEC Project 6680-04-9537-05, Louisville, Kentucky.

MACTEC, 2010a. Status Report of Corrective Action Investigations, Robert Bosch Tool Corporation, Leitchfield Division Building #1, 410 Embry Drive, Leitchfield, Grayson County, Kentucky, Agency Interest #1579, AMEC Project 6680-04-9537-04.

MACTEC, 2010b. Remedial Action Pilot Test Report, Robert Bosch Tool Corporation, Leitchfield Division Building #1, 410 Embry Drive, Leitchfield, Kentucky, AMEC Project 6680-04-9537-05, Louisville, Kentucky.

Carey, D.I. and J.F. Stickney, 2005, Groundwater Resources of Grayson County, Kentucky. Kentucky Geological Survey, County Report 43, Series XII. Available online at: http://www.uky.edu/KGS/water/library/gwatlas/Grayson/Grayson.htm.

Gildersleeve, Benjamin, 1978, Geologic Map of the Leitchfield Quadrangle, Grayson County, Kentucky. U.S. Geological Survey, Map GQ-1316.

Haley & Aldrich, 2005, Hydraulic Response Assessment/Aquifer Testing, Campbell Hausfeld Site, Leitchfield, Kentucky.

Hopkins, H.T., 1966, Fresh-Saline Water Interface Map of Kentucky. Kentucky Geological Survey.

McDowell, Robert C., 1986, The Geology of Kentucky – a Text to Accompany the Geologic Map of Kentucky, U.S. Geological Survey Professional Paper 1151-H.

USEPA, Office of Solid Waste and Emergency Response, Test Methods for Evaluating Solid Waste, Volume II: Field Manual Physical/Chemical Methods, Washington, D.C. SW 846 Third Ed., Nov. 1986.

USEPA, Region IV Environmental Services Division, Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual, Athens, GA, Feb. 1991.

TABLES

Table 1
Well Construction Summary
RBTC LDB #1, Leitchfield, Kentucky
AMEC Project 6680-04-9537

Well ID	KDOW AKGWA #	Completion Date	Inner Casing Diameter (in)	Boring Depth (ft BGS)	Sounded Well Depth (ft BMP)	Length of Perforated Section (ft)	Ground Surface Elevation (ft NAVD)	Measuring Point Elevation (ft NAVD)	Casing Stick-Up (ft AGS)	Top of Screen Elevation (ft NAVD)	Mid- Screen Elevation (ft NAVD)	Bottom of Well Elevation (ft NAVD)
PW-1	0002-0656	4/17/1987	8	367	300+	154	724.4	725.58	1.15	513	436	359
PW-2	N/A	est. 1979	6	est. 475	300+	---	711.3	712.36	1.09	---	---	est. 236
MW-1	8005-3213	3/21/2007	2	17.8	17.4	9.4	723.9	723.51	-0.43	715.5	710.8	706.1
MW-2	8005-3214	3/15/2007	2	17.8	17.4	9.4	711.4	710.98	-0.44	703	698.3	693.6
MW-2M	8005-6303	5/5/2009	2	41	40.6	10	711.4	710.93	-0.45	680.3	675.3	670.3
MW-3	8005-3215	3/14/2007	2	17.5	16.9	9.4	710.5	710.02	-0.50	702.5	697.8	693.1
MW-4	8005-3216	3/14/2007	2	14.5	13.8	7	709.5	709.1	-0.44	702.3	698.8	695.3
MW-5	8005-3217	3/14/2007	2	24.5	23.6	9.4	707.2	706.78	-0.39	692.6	687.9	683.2
MW-5M	8005-6304	5/6/2009	2	38.2	37.2	10	707.2	706.4	-0.76	679.3	674.3	669.3
MW-6	8005-3218	3/21/2007	2	10	9.6	4.8	704.1	703.66	-0.40	698.8	696.4	694
MW-7	8005-3219	3/15/2007	2	13.7	12.5	5.6	703.3	702.54	-0.73	695.6	692.8	690
MW-8	8005-3220	3/15/2007	2	20	19	9.4	709.1	708.71	-0.42	699.1	694.4	689.7
MW-8M	8005-6301	5/5/2009	2	39.6	39.4	10	709.5	708.9	-0.55	679.5	674.5	669.5
MW-9	8005-3705	5/27/2008	2	16.8	15.5	9.4	711.3	710.91	-0.36	704.8	700.1	695.4
MW-10	8005-3710	5/27/2008	2	9.3	9.1	9.4	711.3	710.95	-0.31	711.3	706.6	701.9
MW-11A	8005-3708	5/28/2008	2	15	14.8	4.8	711.2	710.87	-0.36	700.9	698.5	696.1
MW-11B	8005-3709	5/28/2008	2	8.8	8.5	4.5	711.3	710.87	-0.38	706.9	704.8	702.4
MW-12A	8005-3706	5/28/2008	2	15.5	15.5	4.5	711.3	710.89	-0.36	699.9	697.6	695.4
MW-12B	8005-3707	5/28/2008	2	9	8.9	4.5	711.3	710.76	-0.50	706.3	704.1	701.8
MW-13	8005-3721	6/2/2008	2	12.8	12.5	4.5	705.5	705.19	-0.30	697.2	695	692.7
MW-13M	8005-6302	5/5/2009	2	36	35.7	10	706.3	705.94	-0.39	680.2	675.2	670.2
MW-14	8005-3725	6/2/2008	2	14.5	14	9.4	706.5	706.25	-0.26	701.6	696.9	692.2
MW-15	8005-3729	6/2/2008	2	9	8.6	4.5	702.9	702.66	-0.26	698.6	696.3	694.1
MW-16	8005-3722	6/2/2008	2	14	12.7	9.7	707.4	706.74	-0.61	703.7	698.9	694
MW-17	8005-3726	6/2/2008	2	14.5	14	9.4	710.3	709.96	-0.32	705.4	700.7	696
MW-18	8005-3730	6/3/2008	2	7	6.6	2.8	711.7	711.13	-0.58	707.3	705.9	704.5
MW-19	8005-3723	6/2/2008	2	9	8.8	4.8	710.6	710.16	-0.40	706.1	703.7	701.3
MW-20	8005-3727	6/2/2008	2	12.5	11.7	4.8	712	711.3	-0.68	704.4	702	699.6
MW-21	8005-3724	6/2/2008	2	13.5	13	4.8	709.2	708.86	-0.38	700.6	698.2	695.8
MW-22	8005-4866	4/15/2009	2	13	12.6	5	710.4	710.14	-0.28	702.6	700.1	697.6
MW-23	8005-4867	4/15/2009	2	14	13.5	5	707.6	707.32	-0.25	698.9	696.4	693.9
MW-24	8005-4870	4/15/2009	2	13	12.8	5	705.9	705.65	-0.28	697.9	695.4	692.9
MW-25	8005-8218	1/11/2010	2	12	11.5	8	711.4	710.93	-0.39	707.4	703.4	699.4
MW-26	8005-8231	1/11/2010	2	13.5	12.8	9	711.2	710.87	-0.34	707.1	702.6	698.1
MW-27	8005-8217	1/12/2010	2	14	13.7	10	711.3	710.85	-0.41	707.2	702.2	697.2
MW-28	8005-8216	1/11/2010	2	14	13.8	10	709.1	708.83	-0.26	705.1	700.1	695.1

Notes

ft = feet in = inches
MP = measuring point
AGS = above ground/floor surface
WLE = water level elevation
--- = not available

est = estimated
BMP = below measuring point
BGS = below ground surface
NAVD = North American Vertical Datum of 1988
KDOW AKGWA # = well number assigned in the Kentucky Division of Water's Assembled Kentucky Groundwater Database

Prepared by: GWW 1/13/12
Checked by: ALD 1/17/12

Table 2
Summary of Pilot Test and Previous Water Analytical Results, 2007-2010
RBTC LDB #1, Leitchfield, Kentucky
AMEC Project No. 6680-04-9537

				Field Sample ID	MW-1	MW-1	MW-1	MW-2	MW-2	MW-2	MW-2	MW-2	MW-2	MW-2M
				Sample Collection Date	03/22/07	06/11/08	05/19/09	03/22/07	06/04/08	05/19/09	09/28/09	10/09/09	10/26/09	05/19/09
	Units	PRG	MCL	Secondary MCL										
Chlorinated Volatile Organic Compounds														
Tetrachloroethene	mg/L	*0.00066*	*0.0050*		<0.0010	<0.0010	<0.0010	**0.0045 J**	<0.050	**0.00094 J**	**0.0027**	<0.020	<0.010	<0.025
Trichloroethene	mg/L	*0.000028*	*0.0050*		**0.14**	**0.0016**	<0.0010	**2.1**	**1.1**	**0.31**	**1.2**	**0.64**	**0.45**	***3.0***
1,1-Dichloroethene	mg/L	*0.34*	*0.0070*		**0.033**	**0.024**	<0.0010	**3.6**	**5.0**	**2.2**	**0.19**	**0.10**	**0.73**	**6.6**
cis-1,2-Dichloroethene	mg/L	*0.061*	*0.070*		**0.052**	<0.0010	<0.0010	**0.24**	**0.2**	**0.14**	**0.8**	**0.32**	**0.20**	**1.1**
trans-1,2-Dichloroethene	mg/L	*0.12*	*0.10*		**0.00046 J**	<0.0010	<0.0010	**0.0033 J**	<0.050	**0.0012**	**0.0035**	<0.020	<0.010	**0.0088 J**
Vinyl Chloride	mg/L	*0.00002*	*0.00*		**0.004**	<0.0010	<0.0010	**0.013**	<0.050	**0.0046**	**0.0013**	<0.020	<0.010	**0.031**
1,1,1-Trichloroethane	mg/L	*3.2*	*0.20*		**0.0022**	**0.0014**	<0.0010	**0.037**	**0.87**	**0.025**	**0.0053**	<0.020	**0.020**	**0.056**
1,1,2-Trichloroethane	mg/L	*0.0050*	*0.00020*		<0.0010	<0.0010	<0.0010	<0.0050	**0.048 J**	**0.00084 J**	**0.0030**	<0.020	<0.010	<0.025
1,1-Dichloroethane	mg/L	*0.81*	--		**0.008**	**0.0034**	<0.0010	**0.61**	**0.77**	**0.31**	**0.046**	**0.024**	**0.12**	***1.0***
1,2-Dichloroethane	mg/L	*0.00012*	*0.005*		<0.0010	<0.0010	<0.0010	**0.012**	<0.050	**0.0093**	**0.0019**	<0.020	<0.010	**0.025 J**
Carbon Tetrachloride	mg/L	*0.00017*	*0.0050*		<0.0010	<0.0010	<0.0010	<0.0050	<0.050	<0.0010	<0.0010	<0.020	<0.010	<0.025
Chloroform	mg/L	*0.00017*	--		<0.0050	<0.0050	<0.0050	<0.025	<0.25	<0.0050	<0.0050	<0.10	<0.050	<0.13
Methylene Chloride	mg/L	*0.0043*	*0.0050*		<0.0050	<0.0050	<0.0050	<0.025	**0.025 J**	<0.0050	<0.0050	<0.10	<0.050	<0.13
Total CVOCs	mg/L				***0.24***	***0.030***	***0***	***6.6***	***8.0***	***3.0***	***2.3***	***1.1***	***1.5***	***12***
Other Volatile Organic Compounds														
Acetone	mg/L	*0.61*	--		<0.050	<0.050	<0.050	<0.25	<2.5	<0.050	<0.050	<1.0	<0.50	<1.3
Bromomethane	mg/L	--	--											
2-Butanone (MEK)	mg/L	*1.9*	--		<0.010	<0.010	<0.010	<0.050	<0.50	<0.010	<0.010	<0.20	<0.10	<0.25
4-Methyl-2-pentanone (MIBK)	mg/L	*0.16*	--		<0.010	<0.010	<0.010	<0.050	<0.25	<0.010	<0.010	<0.20	<0.10	<0.25
Benzene	mg/L	*0.00034*	*0.0050*		<0.0010	<0.0010	<0.0010	<0.0050	<0.050	<0.0010	<0.0010	<0.020	<0.010	<0.025
n-Butylbenzene	mg/L	*0.24*	--		<0.0010	<0.0010	<0.0010	<0.0050	<0.025	<0.0010	<0.0010	<0.020	<0.010	<0.025
Ethylbenzene	mg/L	*0.0029*	*0.70*		<0.0010	**0.00031 J**	<0.0010	<0.0050	<0.025	<0.0010	<0.0010	<0.020	<0.010	<0.025
Isopropylbenzene	mg/L	*0.66*	--		<0.0010	<0.0010	<0.0010	<0.0050	<0.025	<0.0010	<0.0010	<0.020	<0.010	<0.025
Naphthalene	mg/L	*0.0062*	--		<0.0050	<0.0050	<0.0050	<0.025	**0.042 J**	<0.0050	<0.0050	<0.10	<0.050	**0.0053 J**
Toluene	mg/L	*0.72*	*1.0*		<0.0050	<0.0050	<0.0050	<0.025	<0.25	**0.00048 J**	<0.0050	<0.10	<0.050	<0.13
1,2,4-Trimethylbenzene	mg/L	*0.012*	--		<0.0010	<0.0010	<0.0010	<0.0050	<0.050	<0.0010	<0.0010	<0.020	<0.010	<0.025
1,2,3-Trimethylbenzene	mg/L	--	--		<0.0010	<0.0010	<0.0010	<0.0050	<0.050	<0.0010	<0.0010	<0.020	<0.010	<0.025
1,3,5-Trimethylbenzene	mg/L	*0.012*	--		<0.0010	<0.0010	<0.0010	<0.0050	<0.050	<0.0010	<0.0010	<0.020	<0.010	<0.025
Xylenes, Total	mg/L	*0.21*	*10*		<0.0030	**0.0086**	<0.0030	<0.015	<0.075	<0.0030	<0.0030	<0.060	<0.030	<0.075

Notes:
mg/l Milligrams per liter
-- Not analyzed, not established, or not available
MCL USEPA Maximum Contaminant Level, or Action Level, for drinking water
PRG USEPA Region 9 Preliminary Remediation Goal for tap water
Detected values are indicated in **bold**.
Values exceeding the MCL (or, if no MCL is established, the tap water PRG) are shaded
See laboratory reports for information on laboratory qualifiers
"*Total CVOCs*" is calculated as the sum of the CVOC values, non-detects are counted as zero
Laboratory Qualifiers:
J (EPA) - Estimated value below the practical quantitation limit.

Table 2 (continued)
Summary of Monitoring Well Analytical Results, 2007-2010
RBTC LDB #1, Leitchfield, Kentucky
AMEC Project No. 6680-04-9537

				Field Sample ID	MW-2M	MW-2M	MW-2M	MW-2M	MW-3	MW-3	MW-3	MW-3	MW-3
				Sample Collection Date	09/28/09	10/09/09	10/26/09	10/28/09	03/22/07	06/04/08	05/19/09	09/28/09	10/09/09
	Units	PRG	MCL	Secondary MCL									
Chlorinated Volatile Organic Compounds													
Tetrachloroethene	mg/L	*0.00066*	*0.0050*		**0.0012**	<0.0010	<0.0010	<0.0010	**0.0049 J**	<0.050	<0.010	<0.010	<0.0050
Trichloroethene	mg/L	*0.000028*	*0.0050*		**0.96**	**0.013**	**0.077**	**0.28**	**0.72**	**0.43**	**0.14**	**0.12**	**0.11**
1,1-Dichloroethene	mg/L	*0.34*	*0.0070*		**2.5**	**0.026**	**0.14**	**0.44**	**1.0**	**4.2**	**3.9**	**0.16**	**0.088**
cis-1,2-Dichloroethene	mg/L	*0.061*	*0.070*		**0.52**	**0.0064**	**0.028**	**0.12**	**0.12**	**0.083**	**0.056**	**0.060**	**0.047**
trans-1,2-Dichloroethene	mg/L	*0.12*	*0.10*		**0.0030**	<0.0010	<0.0010	<0.0010	**0.0036 J**	<0.050	<0.010	<0.0010	<0.0050
Vinyl Chloride	mg/L	*0.00002*	*0.00*		**0.020**	<0.0010	<0.0010	**0.0037**	<0.010	<0.050	**0.0030 J**	<0.0010	<0.0050
1,1,1-Trichloroethane	mg/L	*3.2*	*0.20*		**0.032**	<0.0010	<0.0010	**0.0056**	**0.024**	**0.22**	**0.080**	<0.0010	<0.0050
1,1,2-Trichloroethane	mg/L	*0.0050*	*0.00020*		<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.050	<0.010	<0.0010	<0.0050
1,1-Dichloroethane	mg/L	*0.81*	--		**0.38**	**0.0048**	**0.0086**	**0.091**	**0.21**	**0.47**	**0.48**	**0.027**	**0.019**
1,2-Dichloroethane	mg/L	*0.00012*	*0.005*		**0.015**	<0.0010	<0.0010	**0.0032**	**0.0046 J**	**0.014 J**	**0.018**	<0.0010	<0.0050
Carbon Tetrachloride	mg/L	*0.00017*	*0.0050*		<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.050	<0.010	<0.0010	<0.0050
Chloroform	mg/L	*0.00017*	--		<0.0050	<0.0050	<0.0050	<0.0050	<0.050	<0.25	<0.050	<0.0050	<0.025
Methylene Chloride	mg/L	*0.0043*	*0.0050*		<0.0050	<0.0050	<0.0050	<0.0050	<0.050	**0.022 J**	<0.050	<0.0050	<0.025
Total CVOCs	mg/L				***4.4***	***0.050***	***0.25***	***0.94***	***2.1***	***5.4***	***4.7***	***0.37***	***0.26***
Other Volatile Organic Compounds													
Acetone	mg/L	*0.61*	--		<0.050	<0.050	<0.050	<0.050	<0.50	<2.5	<0.50	<0.050	<0.25
Bromomethane	mg/L	--	--										
2-Butanone (MEK)	mg/L	*1.9*	--		<0.010	<0.010	<0.010	<0.010	<0.10	<0.50	<0.10	<0.010	<0.050
4-Methyl-2-pentanone (MIBK)	mg/L	*0.16*	--		<0.010	<0.010	<0.010	<0.010	<0.10	<0.010	<0.10	<0.010	<0.050
Benzene	mg/L	*0.00034*	*0.0050*		<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.050	<0.010	<0.0010	<0.0050
n-Butylbenzene	mg/L	*0.24*	--		<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.0010	<0.010	<0.0010	<0.0050
Ethylbenzene	mg/L	*0.0029*	*0.70*		<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.0010	<0.010	<0.0010	<0.0050
Isopropylbenzene	mg/L	*0.66*	--		<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.0010	<0.010	<0.0010	<0.0050
Naphthalene	mg/L	*0.0062*	--		<0.0050	<0.0050	<0.0050	<0.0050	<0.050	**0.02 J**	**0.0092 J**	<0.0050	<0.025
Toluene	mg/L	*0.72*	*1.0*		<0.0050	<0.0050	<0.0050	<0.0050	<0.050	<0.25	<0.050	<0.0050	<0.025
1,2,4-Trimethylbenzene	mg/L	*0.012*	--		<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.050	<0.010	<0.0010	<0.0050
1,2,3-Trimethylbenzene	mg/L	--	--		<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.050	<0.010	<0.0010	<0.0050
1,3,5-Trimethylbenzene	mg/L	*0.012*	--		<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.050	<0.010	<0.0010	<0.0050
Xylenes, Total	mg/L	*0.21*	*10*		<0.0030	<0.0030	<0.0030	<0.0030	<0.030	**0.00099 J**	<0.030	<0.0030	<0.015

Notes:
mg/l Milligrams per liter
--- Not analyzed, not established, or not available
MCL USEPA Maximum Contaminant Level, or Action Level, for drinking water
PRG USEPA Region 9 Preliminary Remediation Goal for tap water
Detected values are indicated in **bold**.
Values exceeding the MCL (or, if no MCL is established, the tap water PRG) are shaded
See laboratory reports for information on laboratory qualifiers
"*Total CVOCs*" is calculated as the sum of the CVOC values, non-detects are counted as zero
Laboratory Qualifiers:
J (EPA) - Estimated value below the practical quantitation limit.

Prepared by / Date: GWW 7/28/10
Checked by / Date: PSJ 7/28/10

Table 2 (continued)
Summary of Monitoring Well Analytical Results, 2007-2010
RBTC LDB #1, Leitchfield, Kentucky
AMEC Project No. 6680-04-9537

				Field Sample ID	MW-3	MW-4	MW-4	MW-4	MW-4	MW-4	MW-5	MW-5	MW-5	MW-5M
				Sample Collection Date	10/26/09	03/22/07	06/04/08	05/19/09	01/28/10	05/05/10	03/22/07	06/05/08	05/19/09	05/19/09
	Units	PRG	MCL	Secondary MCL										
Chlorinated Volatile Organic Compounds														
Tetrachloroethene	mg/L	*0.00066*	*0.0050*		<0.0020	<0.0010	<0.010	<0.010	<0.0010	**0.00034 J**	<0.050	<0.10	<0.20	<0.25
Trichloroethene	mg/L	*0.000028*	*0.0050*		**0.14**	**0.31**	**0.085**	**0.5**	**0.47**	**0.15**	**25**	**19**	**22**	**20**
1,1-Dichloroethene	mg/L	*0.34*	*0.0070*		**0.13**	**0.11**	**0.15**	**0.24**	**0.29**	**0.18**	**0.26**	**0.2**	**0.30**	**0.24 J**
cis-1,2-Dichloroethene	mg/L	*0.061*	*0.070*		**0.060**	**0.85**	**1.2**	**1.4**	**1.3**	**1.3**	**8.4 V**	**8.8**	**9.2**	**7.3**
trans-1,2-Dichloroethene	mg/L	*0.12*	*0.10*		<0.0020	**0.0031**	<0.010	**0.0042 J**	**0.0054**	**0.0049**	**0.065**	**0.065 J**	<0.20	<0.25
Vinyl Chloride	mg/L	*0.00002*	*0.00*		<0.0020	**0.41**	**0.68**	**0.57**	**0.81**	**1.2**	**0.35**	**0.17**	**0.32**	**0.24 J**
1,1,1-Trichloroethane	mg/L	*3.2*	*0.20*		<0.0020	<0.0010	<0.010	<0.010	<0.0010	**0.0012**	<0.050	<0.10	<0.20	<0.25
1,1,2-Trichloroethane	mg/L	*0.0050*	*0.00020*		<0.0020	<0.0010	<0.010	<0.010	<0.0010	<0.0010	<0.050	<0.10	<0.20	<0.25
1,1-Dichloroethane	mg/L	*0.81*	--		**0.026**	**0.077**	**0.14**	**0.14**	**0.14**	**0.17**	**0.087**	**0.099 J**	**0.14 J**	**0.12 J**
1,2-Dichloroethane	mg/L	*0.00012*	*0.005*		<0.0020	0.00096 J	<0.010	<0.010	**0.0017**	**0.0023**	<0.050	<0.10	<0.20	<0.25
Carbon Tetrachloride	mg/L	*0.00017*	*0.0050*		<0.0020	<0.0010	<0.010	<0.010	<0.0010	<0.0010	<0.050	<0.10	<0.20	<0.25
Chloroform	mg/L	*0.00017*	--		<0.010	<0.0050	<0.050	<0.050	<0.0050	<0.0050	<0.25	<0.50	<1.0	<1.3
Methylene Chloride	mg/L	*0.0043*	*0.0050*		<0.010	<0.0050	<0.050	<0.050	<0.0050	<0.0050	<0.25	<0.50	<1.0	<1.3
Total CVOCs	mg/L				***0.36***	**1.8**	**2.3**	**2.9**	**3.0**	**3.0**	***34***	***28***	***32***	***28***
Other Volatile Organic Compounds														
Acetone	mg/L	*0.61*	--		<0.10	<0.050	<0.50	<0.50	<0.050	<0.050	<2.5	<5.0	<10 J3	<13 J3
Bromomethane	mg/L	--	--			<0.0050	<0.050	<0.050	<0.0050	<0.0050				
2-Butanone (MEK)	mg/L	*1.9*	--		<0.020	<0.010	<0.10	<0.10	<0.010	<0.010	<0.50	<1.0 J3	<2.0	<2.5
4-Methyl-2-pentanone (MIBK)	mg/L	*0.16*	--		<0.020	<0.010	<0.010	<0.010	<0.010	<0.010	<0.50	**0.0065 J**	<2.0	<2.5
Benzene	mg/L	*0.00034*	*0.0050*		<0.0020	<0.0010	<0.010	<0.010	<0.0010	0.00052 J	<0.050	<0.10	<0.20	<0.25
n-Butylbenzene	mg/L	*0.24*	--		<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.025	<0.0010	<0.20	<0.25
Ethylbenzene	mg/L	*0.0029*	*0.70*		<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.025	<0.0010	<0.20	<0.25
Isopropylbenzene	mg/L	*0.66*	--		<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.025	<0.0010	<0.20	<0.25
Naphthalene	mg/L	*0.0062*	--		<0.010	<0.0050	**0.0029 J**	<0.050	<0.0050	<0.0050	<0.25	<0.50	<1.0	<1.3
Toluene	mg/L	*0.72*	*1.0*		<0.010	<0.0050	<0.050	<0.050	<0.0050	<0.0050	<0.25	<0.50	<1.0	<1.3
1,2,4-Trimethylbenzene	mg/L	*0.012*	--		<0.0020	<0.0010	<0.010	<0.010	<0.0010	<0.0010	<0.050	<0.10	<0.20	<0.25
1,2,3-Trimethylbenzene	mg/L	--	--		<0.0020	<0.0010	<0.010	<0.010	<0.0010	<0.0010	<0.050	<0.10	<0.20	<0.25
1,3,5-Trimethylbenzene	mg/L	*0.012*	--		<0.0020	<0.0010	<0.010	<0.010	<0.0010	<0.0010	<0.050	<0.10	<0.20	<0.25
Xylenes, Total	mg/L	*0.21*	*10*		<0.0060	<0.0030	<0.0030	<0.030	<0.0030	<0.0030	<0.015	**0.0011 J**	<0.60	<0.75

Notes:
mg/l Milligrams per liter
--- Not analyzed, not established, or not available
MCL USEPA Maximum Contaminant Level, or Action Level, for drinking water
PRG USEPA Region 9 Preliminary Remediation Goal for tap water
Detected values are indicated in **bold**.
Values exceeding the MCL (or, if no MCL is established, the tap water PRG) are shaded
See laboratory reports for information on laboratory qualifiers
"*Total CVOCs*" is calculated as the sum of the CVOC values, non-detects are counted as zero
Laboratory Qualifiers:
J (EPA) - Estimated value below the practical quantitation limit.

Prepared by / Date: GWW 7/28/10
Checked by / Date: PSJ 7/28/10

Table 2 (continued)
Summary of Monitoring Well Analytical Results, 2007-2010
RBTC LDB #1, Leitchfield, Kentucky
AMEC Project No. 6680-04-9537

				Field Sample ID	MW-6	MW-6	MW-6	MW-7	MW-7	MW-7	MW-8	MW-8	MW-8	MW-8M
				Sample Collection Date	03/22/07	06/05/08	05/19/09	03/22/07	06/05/08	05/19/09	03/22/07	06/05/08	05/19/09	05/19/09
	Units	PRG	MCL	Secondary MCL										
Chlorinated Volatile Organic Compounds														
Tetrachloroethene	mg/L	*0.00066*	*0.0050*		<0.001	<0.0010	<0.0010	**0.00052 J**	<0.0010	<0.0050	<0.020	<0.050	**0.0064**	<0.0010
Trichloroethene	mg/L	*0.000028*	*0.0050*		**0.018**	**0.00040 J**	<0.0010	**0.29**	**0.080**	**0.34**	**9.7**	**6.0**	**5.5**	**0.0043**
1,1-Dichloroethene	mg/L	*0.34*	*0.0070*		**0.014**	<0.0010	<0.0010	**0.0091**	**0.0017**	**0.016**	**0.019 J**	**0.043 J**	**0.037**	<0.0010
cis-1,2-Dichloroethene	mg/L	*0.061*	*0.070*		**0.0009 J**	<0.0010	<0.0010	**0.12**	**0.18**	**0.22**	**0.41**	**0.59**	**0.57**	.00054 J
trans-1,2-Dichloroethene	mg/L	*0.12*	*0.10*		<0.0010	<0.0010	<0.0010	**0.0029**	**0.0039**	**0.0030 J**	**0.0075 J**	<0.050	**0.010**	<0.0010
Vinyl Chloride	mg/L	*0.00002*	*0.00*		<0.0010	<0.0010	<0.0010	**0.0058**	**0.0051**	**0.0069**	<0.020	<0.050	**0.0062**	<0.0010
1,1,1-Trichloroethane	mg/L	*3.2*	*0.20*		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.020	<0.050	<0.0010	<0.0010
1,1,2-Trichloroethane	mg/L	*0.0050*	*0.00020*		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.020	<0.050	**0.00050 J**	<0.0010
1,1-Dichloroethane	mg/L	*0.81*	--		**0.0017**	<0.0010	<0.0010	**0.0014**	**0.00041 J**	**0.0034 J**	<0.020	<0.050	**0.0074**	<0.0010
1,2-Dichloroethane	mg/L	*0.00012*	*0.005*		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.020	<0.050	<0.0010	<0.0010
Carbon Tetrachloride	mg/L	*0.00017*	*0.0050*		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.020	<0.050	<0.0010	<0.0010
Chloroform	mg/L	*0.00017*	--		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	<0.10	<0.25	**0.0006 J**	<0.0050
Methylene Chloride	mg/L	*0.0043*	*0.0050*		<0.0050	**0.00056 J**	<0.0050	<0.0050	<0.0050 J3	<0.025	<0.10	<0.25	<0.0050	<0.0050
Total CVOCs	mg/L				***0.035***	***0.00040***	***0***	***0.43***	***0.27***	***0.59***	***10***	***6.6***	***6.1***	**0.004**
Other Volatile Organic Compounds														
Acetone	mg/L	*0.61*	--		<0.050	<0.050	<0.050 J3	<0.050	<0.050	<0.25	<1.0	<2.5	<0.050	<0.050
Bromomethane	mg/L	--	--											<0.0050
2-Butanone (MEK)	mg/L	*1.9*	--		<0.010	<0.010 J3	<0.010	<0.010	<0.010	<0.050	<0.20	<0.50 J3	<0.010	<0.010
4-Methyl-2-pentanone (MIBK)	mg/L	*0.16*	--		<0.010	<5.0	<0.010	<0.010	<10	<0.050	<0.20	<5.0	<0.010	<0.010
Benzene	mg/L	*0.00034*	*0.0050*		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.020	<0.050	**0.00039 J**	<0.0010
n-Butylbenzene	mg/L	*0.24*	--		<0.0010	<0.50	<0.0010	<0.0010	<1.0	<0.0050	<0.020	<0.50	<0.0010	<0.0010
Ethylbenzene	mg/L	*0.0029*	*0.70*		<0.0010	<0.50	<0.0010	<0.0010	<1.0	<0.0050	<0.020	<0.50	<0.0010	<0.0010
Isopropylbenzene	mg/L	*0.66*	--		<0.0010	<0.50	<0.0010	<0.0010	<1.0	<0.0050	<0.020	<0.50	<0.0010	<0.0010
Naphthalene	mg/L	*0.0062*	--		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	<0.10	<0.25	<0.0050	<0.0050
Toluene	mg/L	*0.72*	*1.0*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	<0.10	<0.25	<0.0050	<0.0050
1,2,4-Trimethylbenzene	mg/L	*0.012*	--		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.020	<0.050	<0.0010	<0.0010
1,2,3-Trimethylbenzene	mg/L	--	--		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.020	<0.050	<0.0010	<0.0010
1,3,5-Trimethylbenzene	mg/L	*0.012*	--		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.020	<0.050	<0.0010	<0.0010
Xylenes, Total	mg/L	*0.21*	*10*		<0.0030	<1.5	<0.0030	<0.0030	<3.0	<0.015	<0.060	<1.5	<0.0030	<0.0030

Notes:
mg/l Milligrams per liter
--- Not analyzed, not established, or not available
MCL USEPA Maximum Contaminant Level, or Action Level, for drinking water
PRG USEPA Region 9 Preliminary Remediation Goal for tap water
Detected values are indicated in **bold**.
Values exceeding the MCL (or, if no MCL is established, the tap water PRG) are shaded
See laboratory reports for information on laboratory qualifiers
"*Total CVOCs*" is calculated as the sum of the CVOC values, non-detects are counted as zero
Laboratory Qualifiers:
J (EPA) - Estimated value below the practical quantitation limit.

Prepared by / Date: GWW 7/28/10
Checked by / Date: PSJ 7/28/10

Table 2 (continued)
Summary of Monitoring Well Analytical Results, 2007-2010
RBTC LDB #1, Leitchfield, Kentucky
AMEC Project No. 6680-04-9537

				Field Sample ID	MW-9	MW-9	MW-9	MW-9	MW-9	MW-9	MW-9	MW-10	MW-10	MW-10
				Sample Collection Date	06/10/08	05/19/09	01/28/10	02/17/10	03/04/10	04/05/10	05/05/10	06/10/08	05/19/09	09/28/09
	Units	PRG	MCL	Secondary MCL										
Chlorinated Volatile Organic Compounds														
Tetrachloroethene	mg/L	*0.00066*	*0.0050*		**0.016**	<0.10	**0.013**	<0.020	<0.0010	<0.0010	<0.020	<0.0010	<0.0010	**0.016**
Trichloroethene	mg/L	*0.000028*	*0.0050*		**13**	**13**	**7.9**	**0.28**	**0.37**	**0.3**	**0.5**	**0.090**	**0.16**	**0.051**
1,1-Dichloroethene	mg/L	*0.34*	*0.0070*		**0.056**	**0.30**	**0.056**	<0.020	**0.0049**	**0.0042**	<0.020	**0.0054**	**0.021**	**0.0042**
cis-1,2-Dichloroethene	mg/L	*0.061*	*0.070*		**2.6**	**2.0**	**3.0**	**0.43**	**0.48**	**0.43**	**0.96**	**0.041**	**0.080**	**0.027**
trans-1,2-Dichloroethene	mg/L	*0.12*	*0.10*		**0.055**	**0.036 J**	**0.065**	<0.020	**0.0067**	**0.0065**	0.012 J	**0.0015**	**0.0035**	**0.0011**
Vinyl Chloride	mg/L	*0.00002*	*0.00*		**0.16**	**0.094 J**	**0.60**	**0.2**	**0.11**	**0.084**	**0.048**	<0.0010	**0.00051 J**	<0.0010
1,1,1-Trichloroethane	mg/L	*3.2*	*0.20*		<0.0010	<0.10	<0.0010	<0.020	<0.0010	<0.0010	<0.020	<0.0010	**0.00046 J**	<0.0010
1,1,2-Trichloroethane	mg/L	*0.0050*	*0.00020*		<0.0010	<0.10	<0.0010	<0.020	<0.0010	<0.0010	<0.020	<0.0010	<0.0010	<0.0010
1,1-Dichloroethane	mg/L	*0.81*	--		**0.016**	**0.068 J**	**0.015**	<0.020	**0.0015**	**0.0012**	<0.020	**0.0016**	**0.0042**	**0.0013**
1,2-Dichloroethane	mg/L	*0.00012*	*0.005*		<0.0010	<0.10	**0.0011**	<0.020	<0.0010	<0.0010	<0.020	<0.0010	<0.0010	<0.0010
Carbon Tetrachloride	mg/L	*0.00017*	*0.0050*		<0.0010	<0.10	<0.0010	<0.020	<0.0010	<0.0010	<0.020	<0.0010	<0.0010	<0.0010
Chloroform	mg/L	*0.00617*	--		**0.0016 J**	<0.50	<0.0050	<0.10	<0.0050	<0.0050	<0.10	**0.00046 J**	<0.0050	<0.0050
Methylene Chloride	mg/L	*0.0043*	*0.0050*		**0.00071 J**	<0.50	<0.0050	<0.10	<0.0050	<0.0050	<0.10	<0.0050	<0.0050	<0.0050
Total CVOCs	mg/L				**16**	**15**	**12**	**0.9**	**1.0**	**0.8**	**1.5**	***0.14***	***0.27***	***0.10***
Other Volatile Organic Compounds														
Acetone	mg/L	*0.61*	--		<0.050	<5.0 J3	<0.050	<1.0	<0.050	<0.050	<1.0	<0.050	<0.050 J3	<0.050
Bromomethane	mg/L	--	--		<0.0050	<1.0	<0.0050	<0.10	<0.0050	<0.0050	<0.10	<0.0050	<0.0050	<0.0050
2-Butanone (MEK)	mg/L	*1.9*	--		<0.010	<1.0	<0.010	<0.20	<0.010	<0.010	<0.20	<0.010	<0.010	<0.010
4-Methyl-2-pentanone (MIBK)	mg/L	*0.16*	--		<2.5	<0.10	<0.010	<0.20	<0.010	<0.010	<0.20	<0.10	<0.010	<0.010
Benzene	mg/L	*0.00034*	*0.0050*		<0.0010	<0.10	<0.0010	<0.020	<0.0010	<0.0010	<0.020	<0.0010	<0.0010	<0.0010
n-Butylbenzene	mg/L	*0.24*	--		<0.25	<0.10	<0.0010	<0.020	<0.0010	<0.0010	<0.020	**0.0033 J**	<0.0010	<0.0010
Ethylbenzene	mg/L	*0.0029*	*0.70*		<0.25	<0.10	<0.0010	<0.020	<0.0010	<0.0010	<0.020	<0.010	<0.0010	<0.0010
Isopropylbenzene	mg/L	*0.66*	--		<0.25	<0.50	<0.0010	<0.020	<0.0010	<0.0010	<0.020	<0.010	<0.0010	<0.0010
Naphthalene	mg/L	*0.0062*	--		<0.0050	<0.50	<0.0050	<0.10	<0.0050	<0.0050	<0.10	<0.0050	**0.00093 J**	<0.0050
Toluene	mg/L	*0.72*	*1.0*		<0.0050	<0.50	<0.0050	<0.10	<0.0050	<0.0050	<0.10	<0.0050	<0.0050	<0.0050
1,2,4-Trimethylbenzene	mg/L	*0.012*	--		**0.001 J**	<0.10	<0.0010	<0.020	<0.0010	<0.0010	<0.020	**0.00069 J**	<0.0010	<0.0010
1,2,3-Trimethylbenzene	mg/L	--	--		<0.0010	<0.10	<0.0010	<0.020	<0.0010	<0.0010	<0.020	<0.0010	<0.0010	<0.0010
1,3,5-Trimethylbenzene	mg/L	*0.012*	--		**0.00035 J**	<0.10	<0.0010	<0.020	<0.0010	<0.0010	<0.020	<0.0010	<0.0010	<0.0010
Xylenes, Total	mg/L	*0.21*	*10*		<0.75	<0.30	<0.0030	<0.060	<0.0030	<0.0030	<0.060	**0.0099 J**	<0.0030	<0.0030

Notes:
mg/l Milligrams per liter
--- Not analyzed, not established, or not available
MCL USEPA Maximum Contaminant Level, or Action Level, for drinking water
PRG USEPA Region 9 Preliminary Remediation Goal for tap water
Detected values are indicated in **bold**.
Values exceeding the MCL (or, if no MCL is established, the tap water PRG) are shaded
See laboratory reports for information on laboratory qualifiers
"*Total CVOCs*" is calculated as the sum of the CVOC values, non-detects are counted as zero
Laboratory Qualifiers:
J (EPA) - Estimated value below the practical quantitation limit.

Prepared by / Date: GWW 7/28/10
Checked by / Date: PSJ 7/28/10

Table 2 (continued)
Summary of Monitoring Well Analytical Results, 2007-2010
RBTC LDB #1, Leitchfield, Kentucky
AMEC Project No. 6680-04-9537

				Field Sample ID	MW-10	MW-10	MW-11A	MW-11A	MW-11A	MW-11A	MW-11A	MW-11A	MW-11A	MW-11B	MW-11B	MW-11B
				Sample Collection Date	10/09/09	10/26/09	06/06/08	05/19/09	01/27/10	02/17/10	03/04/10	04/05/10	05/05/10	06/06/08	05/19/09	01/28/10
	Units	PRG	MCL	Secondary MCL												
Chlorinated Volatile Organic Compounds																
Tetrachloroethene	mg/L	*0.00066*	*0.0050*		**0.017**	**0.034**	0.27 J	0.22	<1.0	<1.0	0.11	**0.19 J**	<2.0	<1.0	0.10 J	<0.050
Trichloroethene	mg/L	*0.000028*	*0.0050*		**0.024**	**0.040**	**56**	**50**	**46**	**40**	**34**	**74**	**59**	**98**	**80**	**90**
1,1-Dichloroethene	mg/L	*0.34*	*0.0070*		<0.0010	**0.0036**	**0.71**	**0.76**	<0.0010	<1.0	**0.74**	**0.6**	<2.0	<1.0	<0.25	<0.050
cis-1,2-Dichloroethene	mg/L	*0.061*	*0.070*		**0.011**	**0.022**	**3.3**	**3.0**	**3.3**	**4.0**	**5.3**	**3.9**	**3.9**	**11**	**9.5**	**9.8**
trans-1,2-Dichloroethene	mg/L	*0.12*	*0.10*		<0.0010	<0.0010	<0.50	**0.034**	**0.046**	<1.0	<0.10	<0.20	<2.0	<1.0	<0.25	**0.1**
Vinyl Chloride	mg/L	*0.00002*	*0.00*		<0.0010	<0.0010	**0.16 J**	**0.081**	**0.083**	<1.0	**0.17**	**0.086 J**	<2.0	<1.0	<0.25	<0.050
1,1,1-Trichloroethane	mg/L	*3.2*	*0.20*		<0.0010	<0.0010	<0.50	**0.01**	<0.0010	<1.0	<0.10	<0.20	<2.0	<1.0	<0.25	<0.050
1,1,2-Trichloroethane	mg/L	*0.0050*	*0.00020*		<0.0010	<0.0010	<0.50	**0.0047 J**	**0.0038**	<1.0	<0.10	<0.20	<2.0	<1.0	<0.25	<0.050
1,1-Dichloroethane	mg/L	*0.81*	--		<0.0010	**0.0011**	<0.50	**0.12**	<1.0	<1.0	**0.12**	**0.14**	<2.0	<1.0	<0.25	<0.050
1,2-Dichloroethane	mg/L	*0.00012*	*0.005*		<0.0010	<0.0010	<0.50	.0035 J	**0.0043**	<1.0	<0.10	<0.20	<2.0	<1.0	<0.25	<0.050
Carbon Tetrachloride	mg/L	*0.00017*	*0.0050*		<0.0010	<0.0010	<0.50	<0.050	**0.0013**	<1.0	<0.10	<0.20	<2.0	<1.0	<0.25	<0.050
Chloroform	mg/L	*0.00617*	--		<0.0050	<0.0050	<2.5	**0.0053 J**	<0.0050	<5.0	<0.50	<1.0	<10	<5.0	<1.3	<0.250
Methylene Chloride	mg/L	*0.0043*	*0.0050*		<0.0050	<0.0050	<2.5	<0.050	<0.0050	<5.0	**0.047 J**	**0.068 J**	**1.7** J	<5.0	<1.3	<0.250
Total CVOCs	mg/L				***0.052***	***0.10***	**60**	**54**	**49**	**44**	**40**	**79**	**65**	**109**	**90**	**100**
Other Volatile Organic Compounds																
Acetone	mg/L	*0.61*	--		<0.050	<0.050	<25	<0.50	<0.050	<50	<5.0	<10	<100	<50	<13	<2.5
Bromomethane	mg/L	--	--		<0.0050	<0.0050	<2.5	<0.050	<0.0050	<5.0	<0.50	<1.0	<10	<5.0	<1.3	<0.25
2-Butanone (MEK)	mg/L	*1.9*	--		<0.010	<0.010	<5.0	<0.10	<0.010	<10	<1.0	<2.0	<20	<10	<2.5	<0.50
4-Methyl-2-pentanone (MIBK)	mg/L	*0.16*	--		<0.010	<0.010	<0.10	<0.10	<0.010	<0.20	<1.0	<2.0	<20	<1.0	<2.5	<0.50
Benzene	mg/L	*0.00034*	*0.0050*		<0.0010	<0.0010	<0.50	<0.010	<0.0010	<1.0	<0.10	<0.20	<2.0	<1.0	<0.25	<0.050
n-Butylbenzene	mg/L	*0.24*	--		<0.0010	<0.0010	<0.010	<0.010	<0.0010	<1.0	<0.10	<0.20	<2.0	<0.10	<0.25	<0.050
Ethylbenzene	mg/L	*0.0029*	*0.70*		<0.0010	<0.0010	<0.010	<0.010	<0.0010	<1.0	<0.10	<0.20	<2.0	<0.10	<0.25	<0.050
Isopropylbenzene	mg/L	*0.66*	--		<0.0010	<0.0010	<0.010	<0.010	<0.0010	<1.0	<0.10	<0.20	<2.0	<0.10	<0.25	<0.050
Naphthalene	mg/L	*0.0062*	--		<0.0050	<0.0050	<2.5	<0.050	<0.0050	<5.0	<0.50	<1.0	<10	<5.0	**0.24** J	<0.25
Toluene	mg/L	*0.72*	*1.0*		<0.0050	<0.0050	<2.5	<0.050	<0.0050	<5.0	<0.50	<1.0	<10	<5.0	<1.3	<0.25
1,2,4-Trimethylbenzene	mg/L	*0.012*	--		<0.0010	<0.0010	<0.50	<0.010	<0.0010	<1.0	<0.10	<0.20	<2.0	<1.0	<0.25	<0.050
1,2,3-Trimethylbenzene	mg/L	--	--		<0.0010	<0.0010	<0.50	<0.010	<0.0010	<1.0	<0.10	<0.20	<2.0	<1.0	<0.25	<0.050
1,3,5-Trimethylbenzene	mg/L	*0.012*	--		<0.0010	<0.0010	<0.50	<0.010	<0.0010	<1.0	<0.10	<0.20	<2.0	<1.0	<0.25	<0.050
Xylenes, Total	mg/L	*0.21*	*10*		<0.0030	<0.0030	<0.030	<0.030	<0.0030	<3.0	<0.30	<0.60	<6.0	<0.30	<0.75	<0.15

Notes:
mg/l Milligrams per liter
--- Not analyzed, not established, or not available
MCL USEPA Maximum Contaminant Level, or Action Level, for drinking water
PRG USEPA Region 9 Preliminary Remediation Goal for tap water
Detected values are indicated in **bold**.
Values exceeding the MCL (or, if no MCL is established, the tap water PRG) are shaded
See laboratory reports for information on laboratory qualifiers
"*Total CVOCs*" is calculated as the sum of the CVOC values, non-detects are counted as zero
Laboratory Qualifiers:
J (EPA) - Estimated value below the practical quantitation limit.

Prepared by / Date: GWW 7/28/10
Checked by / Date: PSJ 7/28/10

Table 2 (continued)
Summary of Monitoring Well Analytical Results, 2007-2010
RBTC LDB #1, Leitchfield, Kentucky
AMEC Project No. 6680-04-9537

				Field Sample ID	MW-11B	MW-11B	MW-11B	MW-11B	MW-12A	MW-12A	MW-12B	MW-12B	MW-13	MW-13	MW-13M
				Sample Collection Date	02/17/10	03/04/10	04/05/10	05/05/10	06/10/08	05/19/09	06/10/08	05/19/09	06/09/08	05/19/09	05/19/09
	Units	PRG	MCL	Secondary MCL											
Chlorinated Volatile Organic Compounds															
Tetrachloroethene	mg/L	*0.00066*	*0.0050*		<2.0	0.067	0.12 J	4.8	**0.24**	**0.24**	**0.14**	<0.50	<0.0010	<0.0010	**0.0063**
Trichloroethene	mg/L	*0.000028*	*0.0050*		**94**	**62**	**160**	**170**	**76**	**76 EFG**	**99**	**110 EFG**	**3.6**	**0.49**	**3.4**
1,1-Dichloroethene	mg/L	*0.34*	*0.0070*		<2.0	**0.026**	<0.25	<2.0	**0.82**	**1.1**	**0.18**	<0.50	**0.0085**	**0.010**	**0.060**
cis-1,2-Dichloroethene	mg/L	*0.061*	*0.070*		**11**	**7.3**	**12**	**16**	**5.8**	**5.9**	**23**	**24**	**2.1**	**2.4**	**0.73**
trans-1,2-Dichloroethene	mg/L	*0.12*	*0.10*		<2.0	**0.071**	**0.11** J	<2.0	**0.045**	<0.20	**0.1**	<0.50	**0.034**	**0.023**	0.014
Vinyl Chloride	mg/L	*0.00002*	*0.00*		<2.0	**0.19**	**0.18** J	<2.0	**0.20**	**0.16 J**	**1.8**	**2.1**	**0.0042**	**0.035**	**0.029**
1,1,1-Trichloroethane	mg/L	*3.2*	*0.20*		<2.0	<0.020	<0.25	<2.0	<0.010	<0.20	<0.010	<0.50	<0.0010	<0.0010	<0.0010
1,1,2-Trichloroethane	mg/L	*0.0050*	*0.00020*		<2.0	<0.020	<0.25	<2.0	<0.010	<0.20	<0.010	<0.50	<0.0010	<0.0010	<0.0010
1,1-Dichloroethane	mg/L	*0.81*	--		<2.0	<0.020	<0.25	<2.0	**0.19**	**0.29**	**0.033**	<0.50	**0.00084 J**	**0.0019**	**0.014**
1,2-Dichloroethane	mg/L	*0.00012*	*0.005*		<2.0	<0.020	<0.25	<2.0	<0.010	<0.20	<0.010	<0.50	<0.0010	<0.0010	<0.0010
Carbon Tetrachloride	mg/L	*0.00017*	*0.0050*		<2.0	<0.020	<0.25	<2.0	<0.010	<0.20	<0.010	<0.50	<0.0010	<0.0010	<0.0010
Chloroform	mg/L	*0.00017*	--		<0.10	<0.10	<1.3	<10	**0.0042 J**	<1.0	**0.0098 J**	<2.5	<0.0050	<0.0050	<0.0050
Methylene Chloride	mg/L	*0.0043*	*0.0050*		<10	**0.013** J	**0.2** J	<10	**0.0086 J**	<1.0	<0.050	<2.5	<0.0050	<0.0050	<0.0050
Total CVOCs	mg/L				**105**	**70**	**173**	**191**	***83***	***84***	***124***	***136***	***5.7***	***3.0***	***4.3***
Other Volatile Organic Compounds															
Acetone	mg/L	*0.61*	--		<100	<1.0	<13	<100	<0.50	<10	<0.50	<25	<0.050	<0.050	<0.050
Bromomethane	mg/L	--	--		<0.10	<0.10	<1.3	<10	<0.050	<1.0	<0.050	<2.5	<0.0050	<0.0050	<0.0050
2-Butanone (MEK)	mg/L	*1.9*	--		<20	**0.16** J	<2.5	<20	<0.10	<2.0	<0.10	<5.0	<0.010	<0.010	<0.010
4-Methyl-2-pentanone (MIBK)	mg/L	*0.16*	--		<20	<0.20	<2.5	<20	<0.010	<2.0	<0.010	<5.0	<0.010	<0.010	<0.010
Benzene	mg/L	*0.00034*	*0.0050*		<2.0	<0.020	<0.25	<2.0	<0.010	<0.20	<0.010	<0.50	**0.00038 J**	**0.00091 J**	<0.0010
n-Butylbenzene	mg/L	*0.24*	--		<2.0	<0.020	<0.25	<2.0	<0.0010	<0.20	<0.0010	<0.50	<0.0010	<0.0010	<0.0010
Ethylbenzene	mg/L	*0.0029*	*0.70*		<2.0	<0.020	<0.25	<2.0	<0.0010	<0.20	<0.0010	<0.50	<0.0010	<0.0010	<0.0010
Isopropylbenzene	mg/L	*0.66*	--		<2.0	<0.020	<0.25	<2.0	<0.0010	<0.20	<0.0010	<0.50	<0.0010	<0.0010	<0.0010
Naphthalene	mg/L	*0.0062*	--		<0.10	<0.10	<1.3	<10	<0.050	<1.0	<0.050	<2.5	**0.00044 J**	<0.0050	**0.00099 JB**
Toluene	mg/L	*0.72*	*1.0*		<0.10	<0.10	<1.3	<10	<0.050	<1.0	**0.0028 J**	<2.5	<0.0050	<0.0050	<0.0050
1,2,4-Trimethylbenzene	mg/L	*0.012*	--		<2.0	<0.020	<0.25	**0.4** J	**0.0068 J**	<0.20	**0.0072 J**	<0.50	<0.0010	<0.0010	<0.0010
1,2,3-Trimethylbenzene	mg/L	--	--		<2.0	<0.020	<0.25	<2.0	<0.010	<0.20	<0.010	<0.50	<0.0010	<0.0010	<0.0010
1,3,5-Trimethylbenzene	mg/L	*0.012*	--		<2.0	<0.020	<0.25	<2.0	**0.0024 J**	<0.20	<0.010	<0.50	<0.0010	<0.0010	<0.0010
Xylenes, Total	mg/L	*0.21*	*10*		<6.0 J	<0.060	<0.75	<6.0	<0.0030	<0.60	<0.0030	<1.5	<0.0030	<0.0030	<0.0030

Notes:
mg/l Milligrams per liter
— Not analyzed, not established, or not available
MCL USEPA Maximum Contaminant Level, or Action Level, for drinking water
PRG USEPA Region 9 Preliminary Remediation Goal for tap water
Detected values are indicated in **bold**.
Values exceeding the MCL (or, if no MCL is established, the tap water PRG) are shaded
See laboratory reports for information on laboratory qualifiers
"*Total CVOCs*" is calculated as the sum of the CVOC values, non-detects are counted as zero
Laboratory Qualifiers:
J (EPA) - Estimated value below the practical quantitation limit.

Prepared by / Date: GWW 7/28/10
Checked by / Date: PSJ 7/28/10

Table 2 (continued)
Summary of Monitoring Well Analytical Results, 2007-2010
RBTC LDB #1, Leitchfield, Kentucky
AMEC Project No. 6680-04-9537

				Field Sample ID	MW-14	MW-14	MW-15	MW-15	MW-16	MW-16	MW-17	MW-17	MW-18	MW-18
				Sample Collection Date	06/09/08	05/19/09	06/09/08	05/19/09	06/09/08	05/19/09	06/11/08	05/19/09	06/11/08	05/19/09
	Units	PRG	MCL	Secondary MCL										
Chlorinated Volatile Organic Compounds														
Tetrachloroethene	mg/L	*0.00066*	*0.0050*		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	**0.098**	**0.19**	<0.0010	<0.0010
Trichloroethene	mg/L	*0.000028*	*0.0050*		<0.0010	<0.0010	**0.00057 J**	<0.0010	**0.0071**	<0.0010	**14**	**24**	**0.010**	**0.0046**
1,1-Dichloroethene	mg/L	*0.34*	*0.0070*		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	**0.4**	**0.28**	**0.078**	**0.12**
cis-1,2-Dichloroethene	mg/L	*0.061*	*0.070*		**0.029**	**0.027**	<0.0010	<0.0010	**0.0067**	**0.0069**	**6.4**	**5.0**	**0.00097 J**	**0.00092 J**
trans-1,2-Dichloroethene	mg/L	*0.12*	*0.10*		<0.0010	**0.00033 J**	<0.0010	<0.0010	<0.0010	<0.0010	**0.042**	**0.019 J**	<0.0010	<0.0010
Vinyl Chloride	mg/L	*0.00002*	*0.00*		**0.0050**	**0.0058**	<0.0010	<0.0010	**0.0017**	**0.0016**	**1.2**	**0.32**	<0.0010	<0.0010
1,1,1-Trichloroethane	mg/L	*3.2*	*0.20*		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.050	**0.0039**	**0.0041**
1,1,2-Trichloroethane	mg/L	*0.0050*	*0.00020*		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.050	<0.0010	<0.0010
1,1-Dichloroethane	mg/L	*0.81*	--		<0.0010	<0.0010	<0.0010	<0.0010	**0.0024**	**0.0029**	**0.52**	**0.22**	**0.015**	**0.019**
1,2-Dichloroethane	mg/L	*0.00012*	*0.005*		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.050	<0.0010	**0.00065 J**
Carbon Tetrachloride	mg/L	*0.00017*	*0.0050*		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.050	<0.0010	<0.0010
Chloroform	mg/L	*0.00617*	--		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.050	<0.25	<0.0050	<0.0050
Methylene Chloride	mg/L	*0.0043*	*0.0050*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.050	<0.25	<0.0050	<0.0050
Total CVOCs	mg/L				***0.034***	***0.033***	***0.00057***	***0***	***0.018***	***0.011***	***23***	***30***	***0.11***	***0.15***
Other Volatile Organic Compounds														
Acetone	mg/L	*0.61*	--		<0.050	**0.01 J**	<0.050	<0.050 J3	<0.050	<0.050 J3	<0.50	<2.5	<0.050	<0.050
Bromomethane	mg/L	--	--		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.050	<0.25	<0.0050	<0.0050
2-Butanone (MEK)	mg/L	*1.9*	--		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.10	<0.50	<0.010	<0.010
4-Methyl-2-pentanone (MIBK)	mg/L	*0.16*	--		<0.50	<0.010	<0.50	<0.010	<0.010	<0.010	<0.010	<0.50	<0.10	<0.010
Benzene	mg/L	*0.00034*	*0.0050*		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	**0.0077 J**	<0.050	<0.0010	<0.0010
n-Butylbenzene	mg/L	*0.24*	--		<0.050	<0.0010	<0.050	<0.0010	<0.0010	<0.0010	<0.0010	<0.050	<0.010	<0.0010
Ethylbenzene	mg/L	*0.0029*	*0.70*		<0.050	<0.0010	<0.050	<0.0010	<0.0010	<0.0010	<0.0010	<0.050	<0.010	<0.0010
Isopropylbenzene	mg/L	*0.66*	--		<0.050	<0.0010	<0.050	<0.0010	<0.0010	<0.0010	<0.0010	<0.050	<0.010	<0.0010
Naphthalene	mg/L	*0.0062*	--		<0.0050	<0.0050	<0.0050	**0.00093 J**	<0.0050	<0.0050	<0.050	**0.046 J**	<0.0050	<0.0050
Toluene	mg/L	*0.72*	*1.0*		<0.0050	**0.00044 J**	<0.0050	<0.0050	<0.0050	<0.0050	<0.050	<0.25	<0.0050	<0.0050
1,2,4-Trimethylbenzene	mg/L	*0.012*	--		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.050	<0.0010	<0.0010
1,2,3-Trimethylbenzene	mg/L	--	--		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.050	<0.0010	<0.0010
1,3,5-Trimethylbenzene	mg/L	*0.012*	--		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.050	<0.0010	<0.0010
Xylenes, Total	mg/L	*0.21*	*10*		<0.15	<0.0030	<0.15	<0.0030	<0.0030	<0.0030	<0.0030	<0.15	<0.030	<0.0030

Notes:
mg/l Milligrams per liter
--- Not analyzed, not established, or not available
MCL USEPA Maximum Contaminant Level, or Action Level, for drinking water
PRG USEPA Region 9 Preliminary Remediation Goal for tap water
Detected values are indicated in **bold**.
Values exceeding the MCL (or, if no MCL is established, the tap water PRG) are shaded
See laboratory reports for information on laboratory qualifiers
"*Total CVOCs*" is calculated as the sum of the CVOC values, non-detects are counted as zero
Laboratory Qualifiers:
J (EPA) - Estimated value below the practical quantitation limit.

Prepared by / Date: GWW 7/28/10
Checked by / Date: PSJ 7/28/10

Table 2 (continued)
Summary of Monitoring Well Analytical Results, 2007-2010
RBTC LDB #1, Leitchfield, Kentucky
AMEC Project No. 6680-04-9537

				Field Sample ID	MW-18	MW-18	MW-18	MW-19	MW-19	MW-20	MW-20	MW-21	MW-21	MW-22
				Sample Collection Date	09/28/09	10/09/09	10/26/09	06/16/08	05/19/09	06/11/08	05/19/09	06/16/08	05/19/09	05/19/09
	Units	PRG	MCL	Secondary MCL										
Chlorinated Volatile Organic Compounds														
Tetrachloroethene	mg/L	*0.00066*	*0.0050*		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	**0.00081 J**	<0.010	**0.00042 J**	**0.024**
Trichloroethene	mg/L	*0.000028*	*0.0050*		**0.0021**	**0.0018**	**0.0024**	<0.0010	<0.0010	**0.011**	**0.0093 J**	**1.3**	**0.23**	**3.7**
1,1-Dichloroethene	mg/L	*0.34*	*0.0070*		**0.024**	**0.012**	**0.027**	<0.0010	<0.0010	**0.91**	**0.82**	**0.014**	**0.0031**	**0.35**
cis-1,2-Dichloroethene	mg/L	*0.061*	*0.070*		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	**0.018**	**0.021**	**0.086**	**0.028**	**0.40**
trans-1,2-Dichloroethene	mg/L	*0.12*	*0.10*		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.010	**0.0047**	**0.021**
Vinyl Chloride	mg/L	*0.00002*	*0.00*		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	**0.0022**	**0.0016**	<0.010	<0.0010	**0.016**
1,1,1-Trichloroethane	mg/L	*3.2*	*0.20*		**0.0013**	<0.0010	<0.0010	<0.0010	<0.0010	**0.014**	**0.013**	<0.010	<0.0010	**0.00054 J**
1,1,2-Trichloroethane	mg/L	*0.0050*	*0.00020*		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.0010	**0.00085 J**
1,1-Dichloroethane	mg/L	*0.81*	--		**0.0062**	**0.0039**	**0.0063**	<0.0010	<0.0010	**0.16**	**0.15**	<0.010	**0.00087 J**	**0.12**
1,2-Dichloroethane	mg/L	*0.00012*	*0.005*		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	**0.0049**	**0.0053**	<0.010	<0.0010	**0.0028**
Carbon Tetrachloride	mg/L	*0.00017*	*0.0050*		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.0010	<0.0010
Chloroform	mg/L	*0.00017*	--		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.050	<0.0050	**0.00063 J**
Methylene Chloride	mg/L	*0.0043*	*0.0050*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.050	<0.0050	**0.00062 J**
Total CVOCs	mg/L				***0.03***	***0.02***	***0.04***	***0***	***0***	***1.1***	***1.0***	***1.4***	***0.27***	***4.6***
Other Volatile Organic Compounds														
Acetone	mg/L	*0.61*	--		<0.050	<0.050	<0.050	<0.050	<0.050 J3	**0.02**	<0.050	<0.50	<0.050	<0.050
Bromomethane	mg/L	--	--		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.050	<0.0050	<0.0050
2-Butanone (MEK)	mg/L	*1.9*	--		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.10	<0.010	<0.010
4-Methyl-2-pentanone (MIBK)	mg/L	*0.16*	--		<0.010	<0.010	<0.010	<0.010	<0.010	<0.25	<0.010	<0.010	<0.010	<0.010
Benzene	mg/L	*0.00034*	*0.0050*		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.0010	<0.0010
n-Butylbenzene	mg/L	*0.24*	--		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.025	<0.0010	<0.0010	<0.0010	<0.0010
Ethylbenzene	mg/L	*0.0029*	*0.70*		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.025	<0.0010	<0.0010	<0.0010	<0.0010
Isopropylbenzene	mg/L	*0.66*	--		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.025	<0.0010	<0.0010	<0.0010	<0.0010
Naphthalene	mg/L	*0.0062*	--		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.050	<0.0050	**0.00093 JB**
Toluene	mg/L	*0.72*	*1.0*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	**0.00032 J**	<0.0050	<0.050	<0.0050	**0.00032 J**
1,2,4-Trimethylbenzene	mg/L	*0.012*	--		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.0010	<0.0010
1,2,3-Trimethylbenzene	mg/L	--	--		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.0010	<0.0010
1,3,5-Trimethylbenzene	mg/L	*0.012*	--		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.0010	<0.0010
Xylenes, Total	mg/L	*0.21*	*10*		<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	**0.027 J**	<0.0030	<0.0030	<0.0030	<0.0030

Notes:
mg/l Milligrams per liter
--- Not analyzed, not established, or not available
MCL USEPA Maximum Contaminant Level, or Action Level, for drinking water
PRG USEPA Region 9 Preliminary Remediation Goal for tap water
Detected values are indicated in **bold**.
Values exceeding the MCL (or, if no MCL is established, the tap water PRG) are shaded
See laboratory reports for information on laboratory qualifiers
"*Total CVOCs*" is calculated as the sum of the CVOC values, non-detects are counted as zero
Laboratory Qualifiers:
J (EPA) - Estimated value below the practical quantitation limit.

Prepared by / Date: GWW 7/28/10
Checked by / Date: PSJ 7/28/10

Table 2 (continued)
Summary of Monitoring Well Analytical Results, 2007-2010
RBTC LDB #1, Leitchfield, Kentucky
AMEC Project No. 6680-04-9537

	Units	PRG	MCL	Secondary MCL	Field Sample ID / Sample Collection Date	MW-23 05/19/09	MW-24 05/19/09	MW-25 01/28/10	MW-25 02/17/10	MW-25 03/04/10	MW-25 04/05/10	MW-25 05/05/10	MW-26 01/28/10	MW-26 05/05/10	MW-27 01/28/10	MW-27 05/05/10
Chlorinated Volatile Organic Compounds																
Tetrachloroethene	mg/L	*0.00066*	*0.0050*			**0.0027**	<0.0010	0.11	<0.020	**0.00048 J**	<0.050	<0.050	0.18	0.13	0.2	0.19
Trichloroethene	mg/L	*0.000028*	*0.0050*			**2.2**	<0.0010	**55**	**0.8**	**1.4**	**3.9**	**2.9**	**46**	**62**	**41**	**92**
1,1-Dichloroethene	mg/L	*0.34*	*0.0070*			**0.016**	<0.0010	**0.87**	<0.020	**0.006**	<0.050	<0.050	**0.6**	**0.27**	**0.98**	**0.72**
cis-1,2-Dichloroethene	mg/L	*0.061*	*0.070*			**0.14**	<0.0010	**1.5**	**0.25**	**0.2**	**0.36**	**0.41**	**5.6**	**11**	**8.1**	**20**
trans-1,2-Dichloroethene	mg/L	*0.12*	*0.10*			**0.030**	<0.0010	**0.028**	<0.020	**0.0012**	<0.050	<0.050	**0.042**	**0.06**	**0.10**	**0.074**
Vinyl Chloride	mg/L	*0.00002*	*0.00*			**0.00039 J**	<0.0010	<0.020	<0.020	<0.0010	<0.050	<0.050	**0.14**	**0.24**	**1.1**	**1.2**
1,1,1-Trichloroethane	mg/L	*3.2*	*0.20*			<0.0010	<0.0010	<0.020	<0.020	<0.0010	<0.050	<0.050	<0.010	<0.010	<0.020	<0.010
1,1,2-Trichloroethane	mg/L	*0.0050*	*0.00020*			<0.0010	<0.0010	<0.020	<0.020	<0.0010	<0.050	<0.050	<0.010	**0.0059 J**	<0.020	**0.0062**
1,1-Dichloroethane	mg/L	*0.81*	--			**0.0027**	<0.0010	**0.14**	<0.020	**0.00078J**	<0.050	<0.050	**0.11**	**0.059**	**1.7**	**1.2**
1,2-Dichloroethane	mg/L	*0.00012*	*0.005*			<0.0010	<0.0010	<0.020	<0.020	<0.0010	<0.050	<0.050	<0.010	**0.007 J**	<0.020	**0.014**
Carbon Tetrachloride	mg/L	*0.00017*	*0.0050*			<0.0010	<0.0010	<0.020	<0.020	<0.0010	<0.050	<0.050	<0.010	<0.010	<0.020	<0.010
Chloroform	mg/L	*0.00017*	--			**0.00036 J**	<0.0050	<0.10	<0.10	<0.0050	<0.25	<0.25	<0.050	**0.0068 J**	<0.10	**0.005**
Methylene Chloride	mg/L	*0.0043*	*0.0050*			<0.0050	<0.0050	<0.10	<0.10	**0.00089J**	**0.039 J**	**0.049 J**	<0.050	**0.0038 J**	<0.10	**0.0078**
Total CVOCs	mg/L					***2.4***	***0***	**58**	**1.1**	**1.6**	**4.3**	**3.3**	**53**	**74**	**53**	**115**
Other Volatile Organic Compounds																
Acetone	mg/L	*0.61*	--			<0.050	<0.050	<1.0	<1.0	**0.042 J**	<2.5	<2.5	<0.50	<0.50	<1.0	<0.50
Bromomethane	mg/L	--	--			<0.0050	<0.0050	<0.10	<0.10	**0.059**	<0.25	<0.25	<0.050	**0.011 J**	<0.10	**0.045 J**
2-Butanone (MEK)	mg/L	*1.9*	--			<0.010	<0.010	<0.20	<0.20	<0.010	<0.50	<0.50	<0.10	<0.10	<0.20	<0.10
4-Methyl-2-pentanone (MIBK)	mg/L	*0.16*	--			<0.010	<0.010	<0.20	<0.20	<0.010	<0.50	<0.50	<0.10	<0.10	<0.20	<0.10
Benzene	mg/L	*0.00034*	*0.0050*			<0.0010	<0.0010	<0.020	<0.020	<0.0010	<0.050	<0.050	<0.010	<0.010	<0.020	<0.010
n-Butylbenzene	mg/L	*0.24*	--			<0.0010	<0.0010	<0.020	<0.020	<0.0010	<0.050	<0.050	<0.010	<0.010	<0.020	<0.010
Ethylbenzene	mg/L	*0.0029*	*0.70*			<0.0010	<0.0010	<0.020	<0.020	<0.0010	<0.050	<0.050	**0.014**	<0.010	<0.020	<0.010
Isopropylbenzene	mg/L	*0.66*	--			<0.0010	<0.0010	<0.020	<0.020	<0.0010	<0.050	<0.050	<0.010	<0.010	<0.020	<0.010
Naphthalene	mg/L	*0.0062*	--			<0.0050	<0.0050	<0.10	<0.10	<0.0050	<0.25	<0.25	<0.050	<0.050	<0.10	<0.050
Toluene	mg/L	*0.72*	*1.0*			<0.0050	<0.0050	<0.10	<0.10	<0.0050	<0.25	<0.25	<0.050	**0.011 J**	<0.10	**0.045 J**
1,2,4-Trimethylbenzene	mg/L	*0.012*	--			<0.0010	<0.0010	<0.020	<0.020	<0.0010	<0.050	<0.050	<0.010	<0.010	<0.020	<0.010
1,2,3-Trimethylbenzene	mg/L	--	--			<0.0010	<0.0010	<0.020	<0.020	<0.0010	<0.050	<0.050	<0.010	<0.010	<0.020	<0.010
1,3,5-Trimethylbenzene	mg/L	*0.012*	--			<0.0010	<0.0010	<0.020	<0.020	<0.0010	<0.050	<0.050	<0.010	<0.010	<0.020	<0.010
Xylenes, Total	mg/L	*0.21*	*10*			<0.0030	<0.0030	<0.060	<0.060	<0.0030	<0.15	<0.15	<0.030	<0.030	<0.060	**0.013 J**

Notes:
mg/l Milligrams per liter
--- Not analyzed, not established, or not available
MCL USEPA Maximum Contaminant Level, or Action Level, for drinking water
PRG USEPA Region 9 Preliminary Remediation Goal for tap water
Detected values are indicated in **bold**.
Values exceeding the MCL (or, if no MCL is established, the tap water PRG) are shaded
See laboratory reports for information on laboratory qualifiers
"*Total CVOCs*" is calculated as the sum of the CVOC values, non-detects are counted as zero
Laboratory Qualifiers:
J (EPA) - Estimated value below the practical quantitation limit.

Prepared by / Date: GWW 7/28/10
Checked by / Date: PSJ 7/28/10

Table 2 (continued)
Summary of Monitoring Well Analytical Results, 2007-2010
RBTC LDB #1, Leitchfield, Kentucky
AMEC Project No. 6680-04-9537

				Field Sample ID	MW-28	MW-28	PW-1	PW-1	PW-1 TOP	PW-1 MIDDLE	PW-1 BOTTOM	PW-1 MIDDLE	PW-1 MIDDLE	PW-1 MIDDLE
				Sample Collection Date	01/28/10	05/05/10	11/23/04	03/13/07	06/03/08	06/03/08	06/03/08	06/18/08	05/19/09	10/26/09
	Units	PRG	MCL	Secondary MCL										
Chlorinated Volatile Organic Compounds														
Tetrachloroethene	mg/L	*0.00066*	*0.0050*		**0.012**	**0.005**	<0.005	<0.0050	<0.050	<0.050	<0.0010	<0.0010	<0.0010	<0.0010
Trichloroethene	mg/L	*0.000028*	*0.0050*		**0.029**	**0.011**	<0.005	**0.034**	**0.02 J**	**0.013**	**0.011**	**0.025**	**0.025**	**0.015**
1,1-Dichloroethene	mg/L	*0.34*	*0.0070*		**0.0018**	<0.0010	**0.044**	**0.27**	**0.41**	**0.39**	**0.50**	**0.26**	**0.91**	**0.37**
cis-1,2-Dichloroethene	mg/L	*0.061*	*0.070*		**0.064**	**0.029**	**0.0080**	**0.12**	**0.088**	**0.085**	**0.088**	**0.095**	**0.078**	**0.075**
trans-1,2-Dichloroethene	mg/L	*0.12*	*0.10*		<0.010	<0.0010	<0.005	<0.0050	<0.0010	<0.0010	<0.0010	<0.0010	**0.00032 J**	<0.0010
Vinyl Chloride	mg/L	*0.00002*	*0.00*		**0.018**	**0.029**	<0.005	<0.0050	**0.0039**	**0.0031**	**0.0023**	**0.0049**	**0.0064**	**0.0089**
1,1,1-Trichloroethane	mg/L	*3.2*	*0.20*		<0.010	<0.0010	<0.005	**0.0082**	**0.022**	**0.016**	<0.0010	**0.051**	**0.14**	**0.068**
1,1,2-Trichloroethane	mg/L	*0.0050*	*0.00020*		<0.010	<0.0010	<0.005	<0.0050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1-Dichloroethane	mg/L	*0.81*	--		**0.013**	**0.012**	**0.070**	**0.31**	**0.40**	**0.34**	**0.41**	**0.42**	**0.55**	**0.34**
1,2-Dichloroethane	mg/L	*0.00012*	*0.005*		<0.010	<0.0010	<0.005	<0.0050	**0.0022**	**0.0022**	**0.0019**	**0.0026**	**0.0040**	**0.0025**
Carbon Tetrachloride	mg/L	*0.00017*	*0.0050*		<0.010	<0.0010	<0.020	<0.020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloroform	mg/L	*0.00617*	--		<0.050	<0.0050	<0.005	<0.10	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Methylene Chloride	mg/L	*0.0043*	*0.0050*		<0.050	0.0006 J	<0.005	<0.10	<0.0050	<0.0050	<0.0050	**0.0021 J**	<0.0050	<0.0050
Total CVOCs	mg/L				**0.14**	**0.09**	**0.12**	**0.74**	**0.95**	**0.85**	**1.0132**	**0.8606**	**1.71372**	**0.8794**
Other Volatile Organic Compounds														
Acetone	mg/L	*0.61*	--		<0.50	<0.050	<0.025	<1.0	<2.5	**0.014 J**	**0.02 J**	**0.011 J**	<0.050	<0.050
Bromomethane	mg/L	--	--		<0.050	<0.0050	<0.005	<0.020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
2-Butanone (MEK)	mg/L	*1.9*	--		<0.10	<0.010	<0.025	<0.20	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
4-Methyl-2-pentanone (MIBK)	mg/L	*0.16*	--		<0.10	<0.010	<0.025	<0.20	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzene	mg/L	*0.00034*	*0.0050*		<0.010	<0.0010	<0.005	<0.020	<0.0010	<0.0010	<0.0010	**0.00036 J**	<0.0010	<0.0010
n-Butylbenzene	mg/L	*0.24*	--		<0.010	<0.0010	<0.005	<0.020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Ethylbenzene	mg/L	*0.0029*	*0.70*		<0.010	<0.0010	<0.005	<0.020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Isopropylbenzene	mg/L	*0.66*	--		<0.010	<0.0010	---	<0.020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Naphthalene	mg/L	*0.0062*	--		<0.050	<0.0050	<0.005	<0.10	<0.0050	<0.0050	<0.0050	**0.0013 J**	<0.0050	<0.0050
Toluene	mg/L	*0.72*	*1.0*		<0.050	<0.0050	<0.005	<0.10	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
1,2,4-Trimethylbenzene	mg/L	*0.012*	--		<0.010	<0.0010	<0.005	<0.020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2,3-Trimethylbenzene	mg/L	--	--		<0.010	<0.0010	---	<0.020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,3,5-Trimethylbenzene	mg/L	*0.012*	--		<0.010	<0.0010	<0.005	<0.020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Xylenes, Total	mg/L	*0.21*	*10*		<0.030	<0.0030	<0.015	<0.060	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Notes:
mg/l Milligrams per liter
--- Not analyzed, not established, or not available
MCL USEPA Maximum Contaminant Level, or Action Level, for drinking water
PRG USEPA Region 9 Preliminary Remediation Goal for tap water
Detected values are indicated in **bold**.
Values exceeding the MCL (or, if no MCL is established, the tap water PRG) are shaded
See laboratory reports for information on laboratory qualifiers
"*Total CVOCs*" is calculated as the sum of the CVOC values, non-detects are counted as zero
Laboratory Qualifiers:
J (EPA) - Estimated value below the practical quantitation limit.

Prepared by / Date: GWW 7/28/10
Checked by / Date: PSJ 7/28/10

Table 2 (continued)
Summary of Monitoring Well Analytical Results, 2007-2010
RBTC LDB #1, Leitchfield, Kentucky
AMEC Project No. 6680-04-9537

				Field Sample ID	PW-2	PW-2 TOP	PW-2 MIDDLE	PW-2 BOTTOM	PW-2 MIDDLE	PW-2 MIDDLE	PW-2 DISCHARGE	PW-2 DISCHARGE	PW-2 DISCHARGE	PW-2 DISCHARGE
				Sample Collection Date	03/14/07	06/03/08	06/03/08	06/03/08	06/18/08	05/19/09	09/28/09	09/29/09	09/30/09	10/02/09
	Units	PRG	MCL	Secondary MCL										
Chlorinated Volatile Organic Compounds														
Tetrachloroethene	mg/L	*0.00066*	*0.0050*		<0.020	**0.0037**	**0.0037**	**0.0030**	**0.0034**	<0.025	<0.020	**0.0067**	**0.0043**	<0.020
Trichloroethene	mg/L	*0.000028*	*0.0050*		**0.96**	**1.5**	**1.4**	**1.3**	**0.51**	**1.5**	**0.20**	**1.3**	**1.1**	**0.68**
1,1-Dichloroethene	mg/L	*0.34*	*0.0070*		**0.18**	**0.96**	**0.91**	**0.80**	**0.33**	**0.74**	**0.077**	**0.37**	**0.41**	**0.41**
cis-1,2-Dichloroethene	mg/L	*0.061*	*0.070*		**1.3**	**1.8**	**1.9**	**1.9**	**1.1**	**2.4**	**0.065**	**0.86**	**1.1**	**1.3**
trans-1,2-Dichloroethene	mg/L	*0.12*	*0.10*		<0.020	**0.0062**	<0.0010	**0.0067**	**0.0064**	**0.014 J**	<0.020	**0.0045**	**0.0061**	<0.020
Vinyl Chloride	mg/L	*0.00002*	*0.00*		<0.020	**0.031**	**0.034**	**0.031**	**0.027**	**0.043**	<0.020	**0.032**	**0.043**	<0.020
1,1,1-Trichloroethane	mg/L	*3.2*	*0.20*		<0.020	**0.006**	**0.0064**	**0.006**	**0.0079**	<0.025	<0.020	**0.0030**	**0.0039**	<0.020
1,1,2-Trichloroethane	mg/L	*0.0050*	*0.00020*		<0.020	<0.0010	<0.0010	<0.0010	<0.0010	<0.025	<0.020	<0.0010	<0.0010	<0.020
1,1-Dichloroethane	mg/L	*0.81*	--		**0.13**	**0.18**	**0.20**	**0.18**	**0.14**	**0.17**	<0.020	**0.089**	**0.11**	**0.083**
1,2-Dichloroethane	mg/L	*0.00012*	*0.005*		<0.020	**0.0031**	**0.0033**	**0.0030**	**0.0036**	<0.025	<0.020	<0.0010	**0.0022**	<0.020
Carbon Tetrachloride	mg/L	*0.00017*	*0.0050*		<0.0050	<0.0010	<0.0010	<0.0010	**0.0014**	<0.025	<0.020	<0.0010	<0.0010	<0.020
Chloroform	mg/L	*0.00017*	--		<0.025	<0.0050	<0.0050	<0.0050	<0.0050	<0.13	<0.10	<0.0050	<0.0050	<0.10
Methylene Chloride	mg/L	*0.0043*	*0.0050*		<0.025	<0.0050	<0.0050	<0.0050	**0.00047 J**	<0.13	<0.10	<0.0050	<0.0050	<0.10
Total CVOCs	mg/L				**2.570**	**4.49**	**4.4574**	**4.2297**	**2.13157**	**4.867**	**0.342**	**2.6652**	**2.7795**	**2.473**
Other Volatile Organic Compounds														
Acetone	mg/L	*0.61*	--		<0.25	**0.013 J**	**0.012 J**	**0.012 J**	**0.011 J,J4**	<1.3	<1.0	<0.050	<0.050	<1.0
Bromomethane	mg/L	--	--		<0.0050	<0.0010	<0.0010	<0.0010	<0.0010	<0.025	<0.020	<0.0010	<0.0010	<0.020
2-Butanone (MEK)	mg/L	*1.9*	--		<0.050	<0.010	<0.010	<0.010	<0.010 J4	<0.25	<0.20	<0.010	<0.010	<0.20
4-Methyl-2-pentanone (MIBK)	mg/L	*0.16*	--		<0.050	<0.10	<0.010	<0.20	<0.010	<0.25	<0.20	<0.010	<0.010	<0.20
Benzene	mg/L	*0.00034*	*0.0050*		<0.0050	<0.0010	<0.0010	<0.0010	<0.010	<0.025	<0.020	<0.0010	<0.0010	<0.020
n-Butylbenzene	mg/L	*0.24*	--		<0.0050	<0.010	<0.0010	<0.020	<0.0010	<0.025	<0.020	<0.0010	<0.0010	<0.020
Ethylbenzene	mg/L	*0.0029*	*0.70*		<0.0050	<0.010	<0.0010	<0.020	<0.0010	<0.025	<0.020	<0.0010	<0.0010	<0.020
Isopropylbenzene	mg/L	*0.66*	--		<0.0050	<0.010 J3	<0.0010	<0.020	<0.0010	<0.025	<0.020	<0.0010	<0.0010	<0.020
Naphthalene	mg/L	*0.0062*	--		<0.025	<0.0050	<0.0050	<0.0050	<0.0050	<0.13	<0.10	<0.0050	<0.0050	<0.10
Toluene	mg/L	*0.72*	*1.0*		<0.025	<0.0050	<0.0050	<0.0050	<0.0050	<0.13	<0.10	<0.0050	<0.0050	<0.10
1,2,4-Trimethylbenzene	mg/L	*0.012*	--		<0.0050	<0.0010	<0.0010	<0.0010	<0.0010	**0.005 J**	<0.020	<0.0010	<0.0010	<0.020
1,2,3-Trimethylbenzene	mg/L	--	--		<0.0050	<0.0010	<0.0010	<0.0010	<0.0010	<0.025	<0.020	<0.0010	<0.0010	<0.020
1,3,5-Trimethylbenzene	mg/L	*0.012*	--		<0.0050	<0.0010	<0.0010	<0.0010	<0.0010	<0.025	<0.020	<0.0010	<0.0010	<0.020
Xylenes, Total	mg/L	*0.21*	*10*		<0.015	<0.030 J3	<0.0030	<0.060	<0.0030	<0.075	<0.060	<0.0030	<0.0030	<0.060

Notes:
mg/l Milligrams per liter
--- Not analyzed, not established, or not available
MCL USEPA Maximum Contaminant Level, or Action Level, for drinking water
PRG USEPA Region 9 Preliminary Remediation Goal for tap water
Detected values are indicated in **bold**.
Values exceeding the MCL (or, if no MCL is established, the tap water PRG) are shaded
See laboratory reports for information on laboratory qualifiers
"*Total CVOCs*" is calculated as the sum of the CVOC values, non-detects are counted as zero
Laboratory Qualifiers:
J (EPA) - Estimated value below the practical quantitation limit.

Prepared by / Date: GWW 7/28/10
Checked by / Date: PSJ 7/28/10

Table 2 (continued)
Summary of Monitoring Well Analytical Results, 2007-2010
RBTC LDB #1, Leitchfield, Kentucky
AMEC Project No. 6680-04-9537

					Field Sample ID	PW-2 DISCHARGE	PW-2 DISCHARGE	PW-2 DISCHARGE	PW-2 DISCHARGE	PW-2 DISCHARGE	PW-2 DISCHARGE
					Sample Collection Date	10/06/09	10/09/09	10/13/09	10/16/09	10/20/09	10/26/09
	Units	PRG	MCL	Secondary MCL							
Chlorinated Volatile Organic Compounds											
Tetrachloroethene	mg/L	0.00066	0.0050			**0.0021**	<0.020	<0.020	**0.0022**	<0.020	<0.020
Trichloroethene	mg/L	0.000028	0.0050			**0.75**	**0.42**	**0.74**	**0.68**	**0.70**	**0.59**
1,1-Dichloroethene	mg/L	0.34	0.0070			**0.40**	**0.20**	**0.48**	**0.36**	**0.40**	**0.36**
cis-1,2-Dichloroethene	mg/L	0.061	0.070			**1.7**	**0.97**	**1.9**	**2.0**	**2.0**	**1.7**
trans-1,2-Dichloroethene	mg/L	0.12	0.10			**0.0058**	<0.020	<0.020	**0.0081**	<0.020	<0.020
Vinyl Chloride	mg/L	0.00002	0.00			**0.038**	<0.020	**0.030**	**0.037**	**0.033**	**0.033**
1,1,1-Trichloroethane	mg/L	3.2	0.20			**0.0011**	<0.020	<0.020	<0.0010	<0.020	<0.020
1,1,2-Trichloroethane	mg/L	0.0050	0.00020			<0.0010	<0.020	<0.020	<0.0010	<0.020	<0.020
1,1-Dichloroethane	mg/L	0.81	--			**0.092**	**0.054**	**0.12**	**0.14**	**0.11**	**0.092**
1,2-Dichloroethane	mg/L	0.00012	0.005			**0.0018**	<0.020	<0.020	**0.0018**	<0.020	<0.020
Carbon Tetrachloride	mg/L	0.00017	0.0050			<0.0010	<0.020	<0.020	<0.0010	<0.020	<0.020
Chloroform	mg/L	0.00617	--			<0.0050	<0.10	<0.10	<0.0050	<0.10	<0.10
Methylene Chloride	mg/L	0.0043	0.0050			<0.0050	<0.10	<0.10	<0.0050	<0.10	<0.10
Total CVOCs	mg/L					**2.9908**	**1.644**	**3.27**	**3.23**	**3.24**	**2.78**
Other Volatile Organic Compounds											
Acetone	mg/L	0.61	--			<0.050	<1.0	<1.0	<0.050	<1.0	<1.0
Bromomethane	mg/L	--	--			<0.0010	<0.020	<0.020	<0.0010	<0.020	<0.020
2-Butanone (MEK)	mg/L	1.9	--			<0.010	<0.20	<0.20	<0.010	<0.20	<0.20
4-Methyl-2-pentanone (MIBK)	mg/L	0.16	--			<0.010	<0.20	<0.20	<0.010	<0.20	<0.20
Benzene	mg/L	0.00034	0.0050			<0.0010	<0.020	<0.020	<0.0010	<0.020	<0.020
n-Butylbenzene	mg/L	0.24	--			<0.0010	<0.020	<0.020	<0.0010	<0.020	<0.020
Ethylbenzene	mg/L	0.0029	0.70			<0.0010	<0.020	<0.020	<0.0010	<0.020	<0.020
Isopropylbenzene	mg/L	0.66	--			<0.0010	<0.020	<0.020	<0.0010	<0.020	<0.020
Naphthalene	mg/L	0.0062	--			<0.0050	<0.10	<0.10	<0.0050	<0.10	<0.10
Toluene	mg/L	0.72	1.0			<0.0050	<0.10	<0.10	<0.0050	<0.10	<0.10
1,2,4-Trimethylbenzene	mg/L	0.012	--			<0.0010	<0.020	<0.020	<0.0010	<0.020	<0.020
1,2,3-Trimethylbenzene	mg/L	--	--			<0.0010	<0.020	<0.020	<0.0010	<0.020	<0.020
1,3,5-Trimethylbenzene	mg/L	0.012	--			<0.0010	<0.020	<0.020	<0.0010	<0.020	<0.020
Xylenes, Total	mg/L	0.21	10			<0.0030	<0.060	<0.060	<0.0030	<0.060	<0.060

Notes:
mg/l Milligrams per liter
--- Not analyzed, not established, or not available
MCL USEPA Maximum Contaminant Level, or Action Level, for drinking water
PRG USEPA Region 9 Preliminary Remediation Goal for tap water
Detected values are indicated in **bold**.
Values exceeding the MCL (or, if no MCL is established, the tap water PRG) are shaded
See laboratory reports for information on laboratory qualifiers
"*Total CVOCs*" is calculated as the sum of the CVOC values, non-detects are counted as zero
Laboratory Qualifiers:
J (EPA) - Estimated value below the practical quantitation limit.

Prepared by / Date: GWW 7/28/10
Checked by / Date: PSJ 7/28/10

TABLE 3

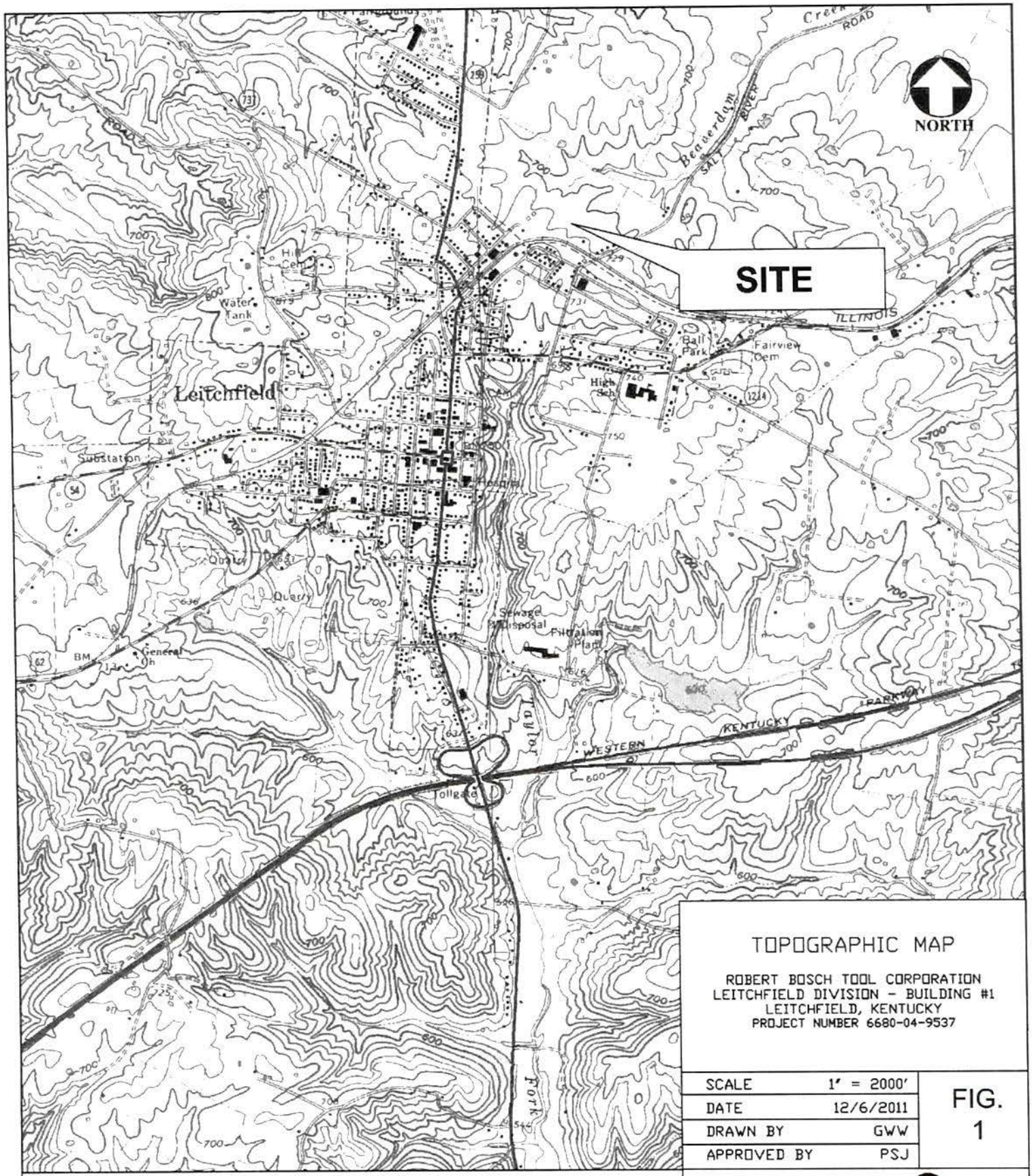
Groundwater Monitoring Schedule for Remediation Performance
RBTC LDB #1, Leitchfield, Kentucky
Agency Interest # 1579
AMEC Project 6680-04-9537

Category	Sampling Locations	Frequency	Parameters All Samples	
Baseline	All onsite wells	Less than 24 hours prior to injection	Field	Groundwater Elevations.
	All onsite wells	Prior to injection	Field	pH, ORP, DO, Temperature, Specific Conductance.
			Lab	VOCs (EPA Method 8260B).
	MW-4, MW-5, MW-7, MW-10, MW-13, MW-17, MW-22	Prior to injection	Lab	Methane, Ethane, and Ethene (EPA Method RSK 175), Chloride (EPA 325.2), TDS (EPA 160.1), Nitrate and Sulfate (IC Method E300).
Post-Injection BOS-100 Effectiveness	MW-11A, MW-11B, MW-12A, MW-12B, MW-27	Monthly for 90 days after injection	Field	Groundwater Elevations.
		90 days after injection.	Lab	Chloride (EPA 325.2) and Iron (EPA 6010).
		1, 2, and 3 months after injection.	Lab	VOCs (EPA Method 8260B).
Post-Injection Biostimulation Effectiveness	MW-4, MW-5, MW-7, MW-10, MW-13, MW-17, MW-13M, MW-22	Monthly for 90 days after injection	Field	Groundwater Elevations, pH, ORP, DO, Temperature, Specific Conductance.
		90 days after injection	Lab	Chloride (EPA 325.2), Nitrate and Sulfate (IC Method E300),
		Quarterly for 1st year, semi-annually thereafter	Lab	VOCs (EPA Method 8260B), Methane, Ethane, and Ethene (EPA Method RSK 175), Total Organic Carbon ([TOC] EPA Method 9060).
			Field	Groundwater Elevations, pH, ORP, DO, Temperature, Specific Conductance.
	MW-4, MW-7, MW-10, MW-13, MW-22	90 days after injection.	Lab	PCR analyses (Census with DNA and RNA) Testing for successful stimulation and propagation of dehalococcoides bacteria.
Annual Compliance Monitoring	All onsite wells	Annually	Field	Groundwater Elevations.
			Field	pH, ORP, DO, Temperature, Specific Conductance.
			Lab	VOCs (EPA Method 8260B).

VOCs = Volatile Organic Compounds
ORP = Oxidation Reduction Potential
DO = Dissolved Oxygen
PCR = Polymerase Chain Reaction
DNA = Deoxyribonucleic Acid
RNA = Ribonucleic Acid

Prepared by / Date: GWW 1/11/12
Checked by / Date: PSJ 1/11/12

FIGURES



TOPOGRAPHIC MAP

ROBERT BOSCH TOOL CORPORATION
LEITCHFIELD DIVISION - BUILDING #1
LEITCHFIELD, KENTUCKY
PROJECT NUMBER 6680-04-9537

SCALE	1' = 2000'
DATE	12/6/2011
DRAWN BY	GWW
APPROVED BY	PSJ

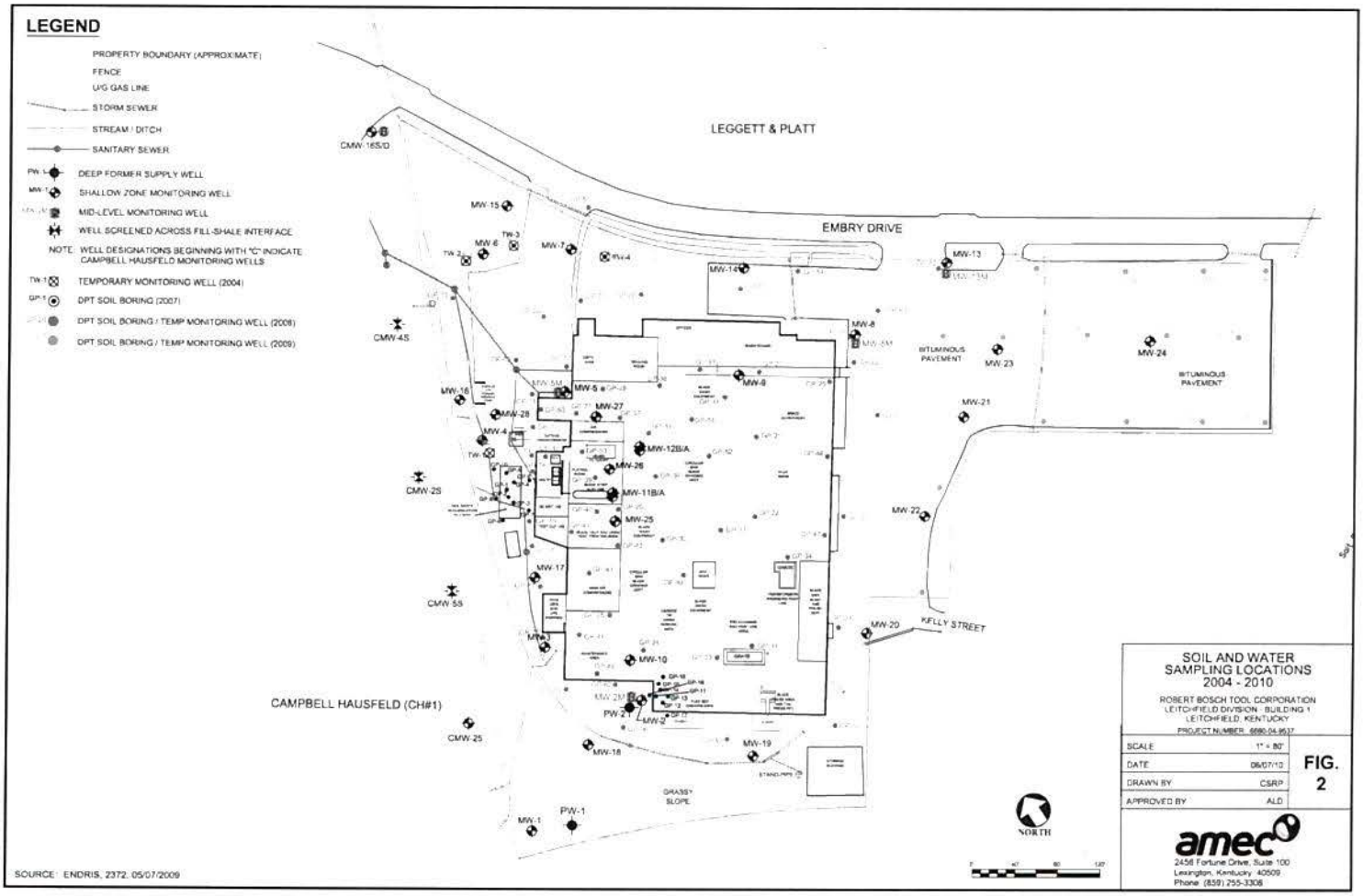
FIG. 1

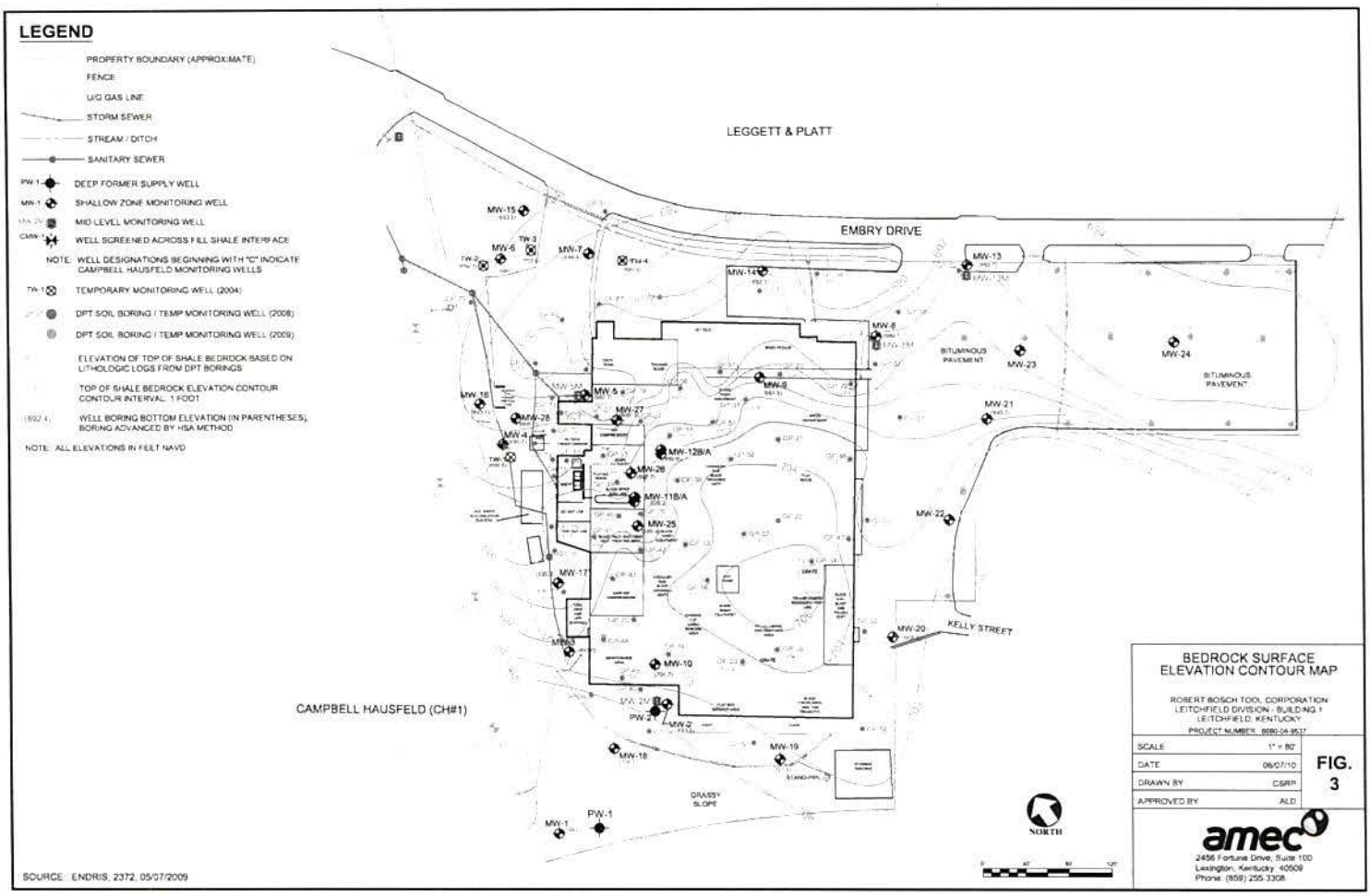
0 1000 2000 3000
SCALE IN FEET

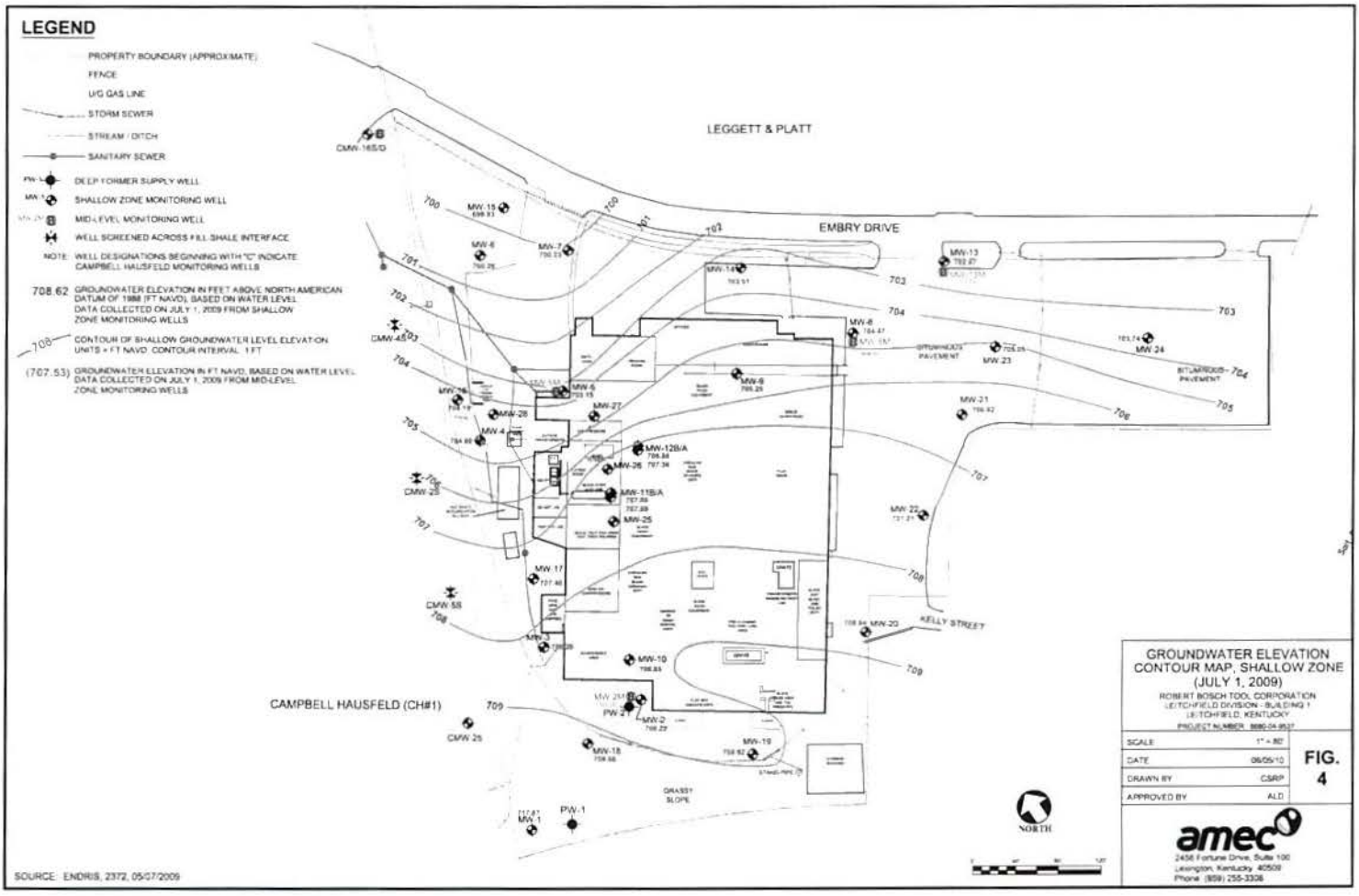
KENTUCKY
QUADRANGLE LOCATION

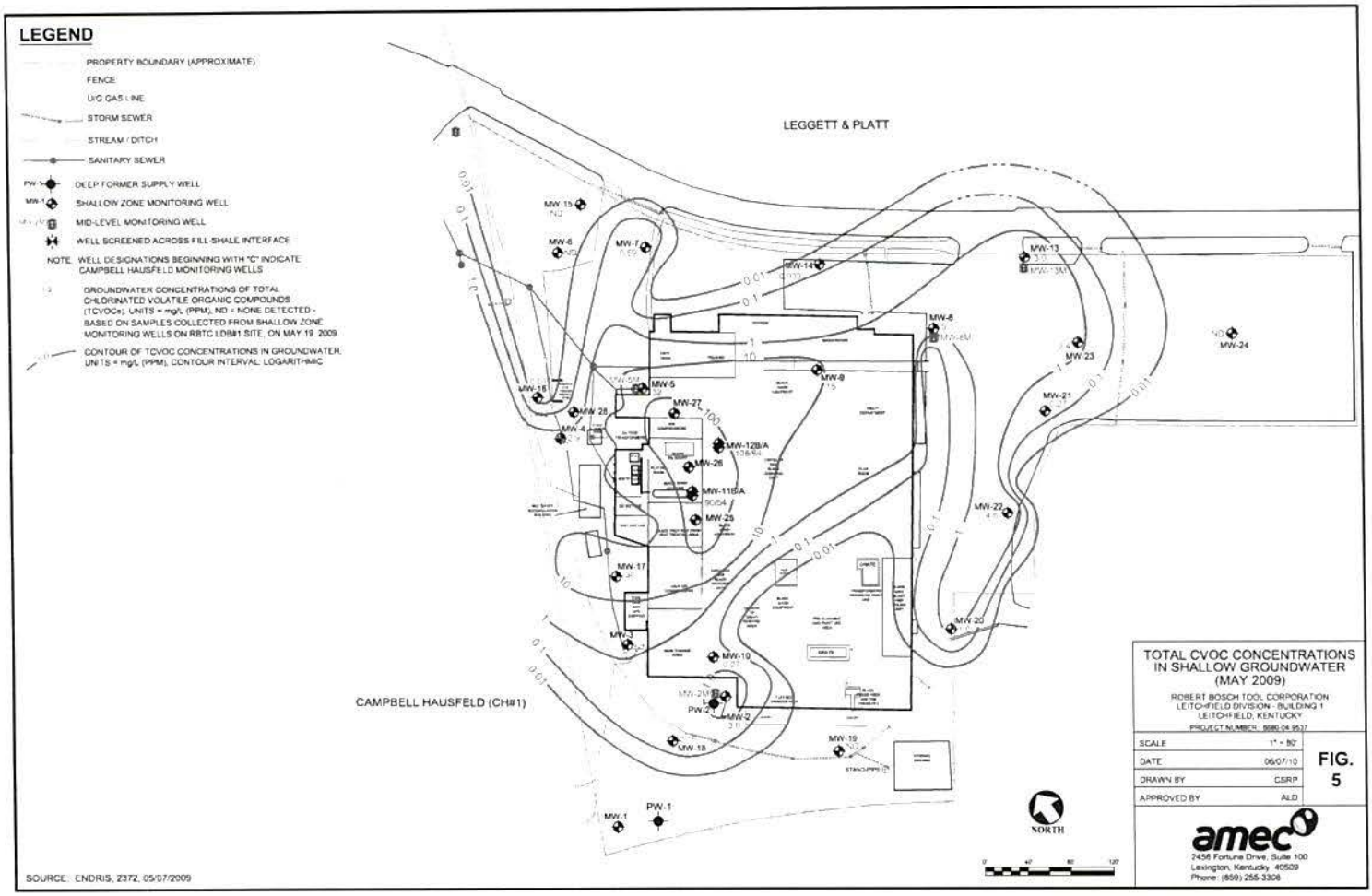
SOURCE: USGS 7.5' TOPOGRAPHIC QUADRANGLE MAP, LEITCHFIELD, KENTUCKY, 1967

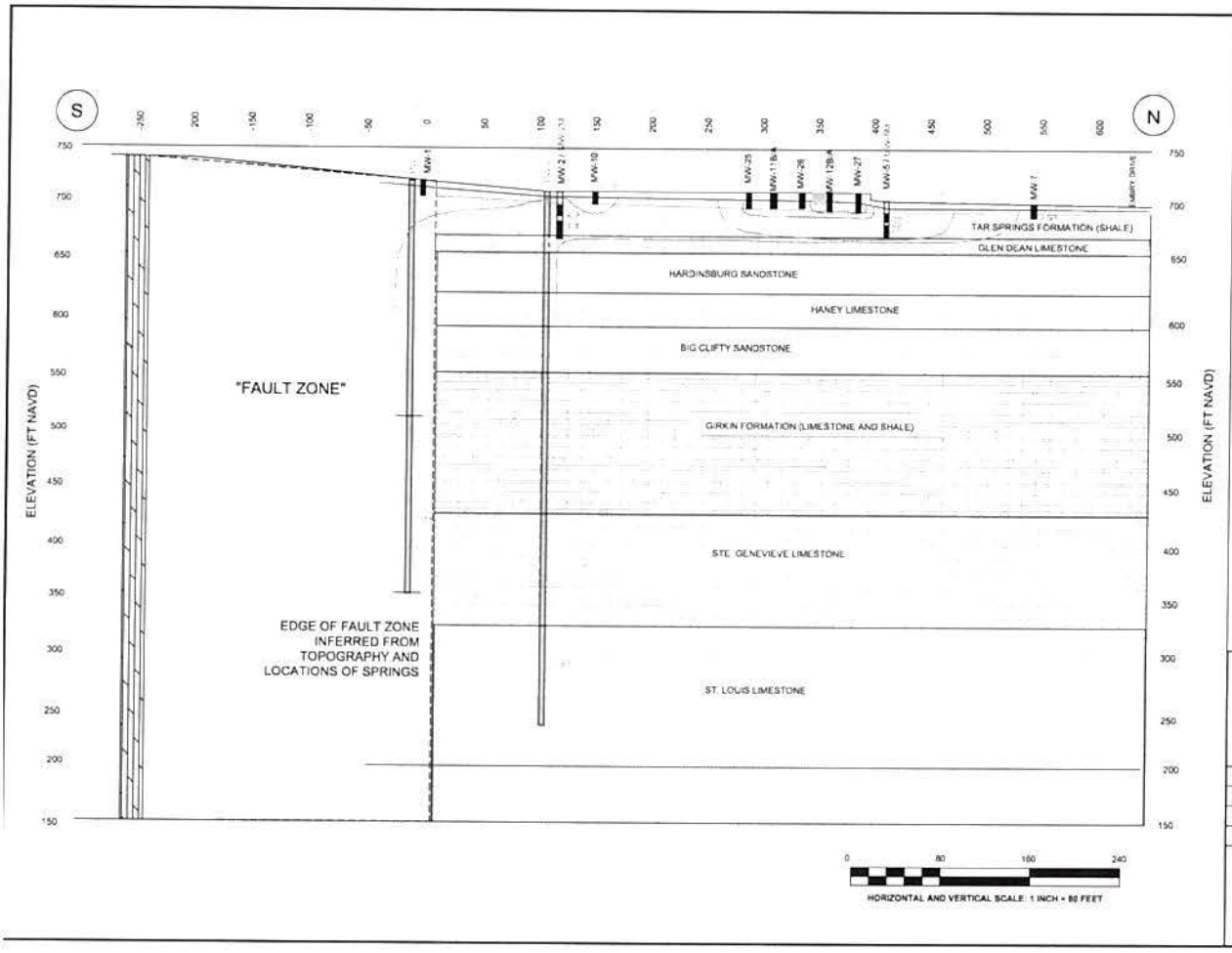
amec
2456 FORTUNE DRIVE, SUITE 100
LEXINGTON, KENTUCKY 40509
PHONE (859) 255-3308


LEGEND
PROPERTY BOUNDARY (APPROXIMATE)
FENCE
U/G GAS LINE
STORM SEWER
STREAM / DITCH
SANITARY SEWER
DEEP FORMER SUPPLY WELL
SHALLOW ZONE MONITORING WELL
MID-LEVEL MONITORING WELL
WELL SCREENED ACROSS FILL-SHALE INTERFACE
NOTE: WELL DESIGNATIONS BEGINNING WITH "C" INDICATE CAMPBELL HAUSFELD MONITORING WELLS
TEMPORARY MONITORING WELL (2004)
DPT SOIL BORING (2007)
DPT SOIL BORING / TEMP MONITORING WELL (2008)
DPT SOIL BORING / TEMP MONITORING WELL (2009)
LEGGETT & PLATT
EMBRY DRIVE
KELLY STREET
CAMPBELL HAUSFELD (CH#1)
BITUMINOUS PAVEMENT
GRASSY SLOPE
CMW-16S/D
CMW-4S
CMW-2S
CMW-5S
CMW-25
MW-1
PW-1
PW-2
MW-2
MW-2M
MW-3
MW-4
MW-5
MW-5M
MW-6
MW-7
MW-8
MW-8M
MW-9
MW-10
MW-11B/A
MW-12B/A
MW-13
MW-14
MW-15
MW-16
MW-17
MW-18
MW-19
MW-20
MW-21
MW-22
MW-23
MW-24
MW-25
MW-26
MW-27
MW-28
TW-2
TW-3
TW-4
NORTH
SOURCE: ENDRIS, 2372, 05/07/2009
SOIL AND WATER SAMPLING LOCATIONS 2004 - 2010
ROBERT BOSCH TOOL CORPORATION
LEITCHFIELD DIVISION - BUILDING 1
LEITCHFIELD, KENTUCKY
PROJECT NUMBER: 6690-04-9537
SCALE 1" = 80'
DATE 06/07/10
DRAWN BY CSRP
APPROVED BY ALD
FIG. 2
amec
2456 Fortune Drive, Suite 100
Lexington, Kentucky 40509
Phone: (859) 255-3308


LEGEND
PROPERTY BOUNDARY (APPROXIMATE)
FENCE
U/G GAS LINE
STORM SEWER
STREAM / DITCH
SANITARY SEWER
DEEP FORMER SUPPLY WELL
SHALLOW ZONE MONITORING WELL
MID-LEVEL MONITORING WELL
WELL SCREENED ACROSS FILL SHALE INTERFACE
NOTE: WELL DESIGNATIONS BEGINNING WITH "C" INDICATE CAMPBELL HAUSFELD MONITORING WELLS
TEMPORARY MONITORING WELL (2004)
DPT SOIL BORING / TEMP MONITORING WELL (2008)
DPT SOIL BORING / TEMP MONITORING WELL (2009)
ELEVATION OF TOP OF SHALE BEDROCK BASED ON LITHOLOGIC LOGS FROM DPT BORINGS
TOP OF SHALE BEDROCK ELEVATION CONTOUR CONTOUR INTERVAL: 1 FOOT
WELL BORING BOTTOM ELEVATION (IN PARENTHESES), BORING ADVANCED BY HSA METHOD
NOTE: ALL ELEVATIONS IN FEET NAVD
SOURCE: ENDRIS, 2372, 05/07/2009
LEGGETT & PLATT
EMBRY DRIVE
KELLY STREET
CAMPBELL HAUSFELD (CH#1)
BITUMINOUS PAVEMENT
GRASSY SLOPE
NORTH
MW-1
MW-2
MW-4
MW-5
MW-6
MW-7
MW-8
MW-9
MW-10
MW-11B/A
MW-12B/A
MW-13
MW-14
MW-15
MW-16
MW-17
MW-18
MW-19
MW-20
MW-21
MW-22
MW-23
MW-24
MW-25
MW-26
MW-27
MW-28
PW-1
PW-2
TW-2
TW-3
TW-4
BEDROCK SURFACE ELEVATION CONTOUR MAP
ROBERT BOSCH TOOL CORPORATION
LEITCHFIELD DIVISION - BUILDING 1
LEITCHFIELD, KENTUCKY
PROJECT NUMBER: 6680-04-9517
SCALE 1" = 80'
DATE 06/07/10
DRAWN BY CSRP
APPROVED BY ALD
FIG. 3
amec
2456 Fortune Drive, Suite 100
Lexington, Kentucky 40509
Phone: (859) 255-3308


LEGEND
PROPERTY BOUNDARY (APPROXIMATE)
FENCE
U/G GAS LINE
STORM SEWER
STREAM / DITCH
SANITARY SEWER
DEEP FORMER SUPPLY WELL
SHALLOW ZONE MONITORING WELL
MID-LEVEL MONITORING WELL
WELL SCREENED ACROSS FILL/SHALE INTERFACE
NOTE: WELL DESIGNATIONS BEGINNING WITH "C" INDICATE CAMPBELL HAUSFELD MONITORING WELLS
708.62 GROUNDWATER ELEVATION IN FEET ABOVE NORTH AMERICAN DATUM OF 1988 (FT NAVD), BASED ON WATER LEVEL DATA COLLECTED ON JULY 1, 2009 FROM SHALLOW ZONE MONITORING WELLS
708 CONTOUR OF SHALLOW GROUNDWATER LEVEL ELEVATION UNITS = FT NAVD. CONTOUR INTERVAL 1 FT
(707.53) GROUNDWATER ELEVATION IN FT NAVD, BASED ON WATER LEVEL DATA COLLECTED ON JULY 1, 2009 FROM MID-LEVEL ZONE MONITORING WELLS
LEGGETT & PLATT
EMBRY DRIVE
KELLY STREET
CAMPBELL HAUSFELD (CH#1)
GRASSY SLOPE
BITUMINOUS PAVEMENT
NORTH
SOURCE: ENDRIS, 2372, 05/07/2009
GROUNDWATER ELEVATION CONTOUR MAP, SHALLOW ZONE (JULY 1, 2009)
ROBERT BOSCH TOOL CORPORATION
LEITCHFIELD DIVISION - BUILDING 1
LEITCHFIELD, KENTUCKY
PROJECT NUMBER: 8880-09-9537
SCALE 1" = 80'
DATE 06/05/10
DRAWN BY CSRP
APPROVED BY ALD
FIG. 4
amec
2456 Fortune Drive, Suite 100
Lexington, Kentucky 40509
Phone: (859) 255-3308


LEGEND
PROPERTY BOUNDARY (APPROXIMATE)
FENCE
U/G GAS LINE
STORM SEWER
STREAM / DITCH
SANITARY SEWER
DEEP FORMER SUPPLY WELL
SHALLOW ZONE MONITORING WELL
MID-LEVEL MONITORING WELL
WELL SCREENED ACROSS FILL-SHALE INTERFACE
NOTE: WELL DESIGNATIONS BEGINNING WITH "C" INDICATE CAMPBELL HAUSFELD MONITORING WELLS
GROUNDWATER CONCENTRATIONS OF TOTAL CHLORINATED VOLATILE ORGANIC COMPOUNDS (TCVOCs); UNITS = mg/L (PPM); ND = NONE DETECTED - BASED ON SAMPLES COLLECTED FROM SHALLOW ZONE MONITORING WELLS ON RBTC LDB#1 SITE, ON MAY 19, 2009
CONTOUR OF TCVOC CONCENTRATIONS IN GROUNDWATER. UNITS = mg/L (PPM). CONTOUR INTERVAL: LOGARITHMIC
LEGGETT & PLATT
CAMPBELL HAUSFELD (CH#1)
MW-15
MW-6
MW-7
MW-14
MW-13
MW-8
MW-24
MW-23
MW-9
MW-5
MW-18
MW-28
MW-27
MW-21
MW-4
MW-12B/A
MW-26
MW-11B/A
MW-22
MW-25
MW-17
MW-20
MW-3
MW-10
PW-2
MW-2
MW-19
MW-16
MW-1
PW-1
NORTH
0
40
80
120
TOTAL CVOC CONCENTRATIONS IN SHALLOW GROUNDWATER (MAY 2009)
ROBERT BOSCH TOOL CORPORATION
LEITCHFIELD DIVISION - BUILDING 1
LEITCHFIELD, KENTUCKY
PROJECT NUMBER: 6080.04.9537
SCALE 1" = 80'
DATE 06/07/10
DRAWN BY CSRP
APPROVED BY ALD
FIG. 5
amec
7456 Fortune Drive, Suite 100
Lexington, Kentucky 40509
Phone: (859) 255-3308
SOURCE: ENDRIS, 2372, 05/07/2009



LEGEND

- DEEP FORMER SUPPLY WELL
- MW-2 — SHALLOW ZONE MONITORING WELL
- MID-LEVEL MONITORING WELL
- MONITORING WELL PAIR WITH DUAL SCREEN INTERVALS
- GROUNDWATER CONCENTRATIONS OF TOTAL CHLORINATED VOLATILE ORGANIC COMPOUNDS (TCVOCs), UNITY - mg/L (PPM., NC - NONE DETECTED - BASED ON SAMPLES COLLECTED FROM RBTC LOBBY SITE ON MAY 19, 2009
- CONTOUR OF TCVOC CONCENTRATIONS IN GROUNDWATER, UNITS = mg/L (PPM), CONTOUR INTERVAL LOGARITHMIC
- CONTOUR OF TCVOC CONCENTRTATIONS IN GROUNOWATER, WITH UNCERTAIN BOUNDARY

CVOC CONTOURS ON GEOLOGIC CROSS-SECTION

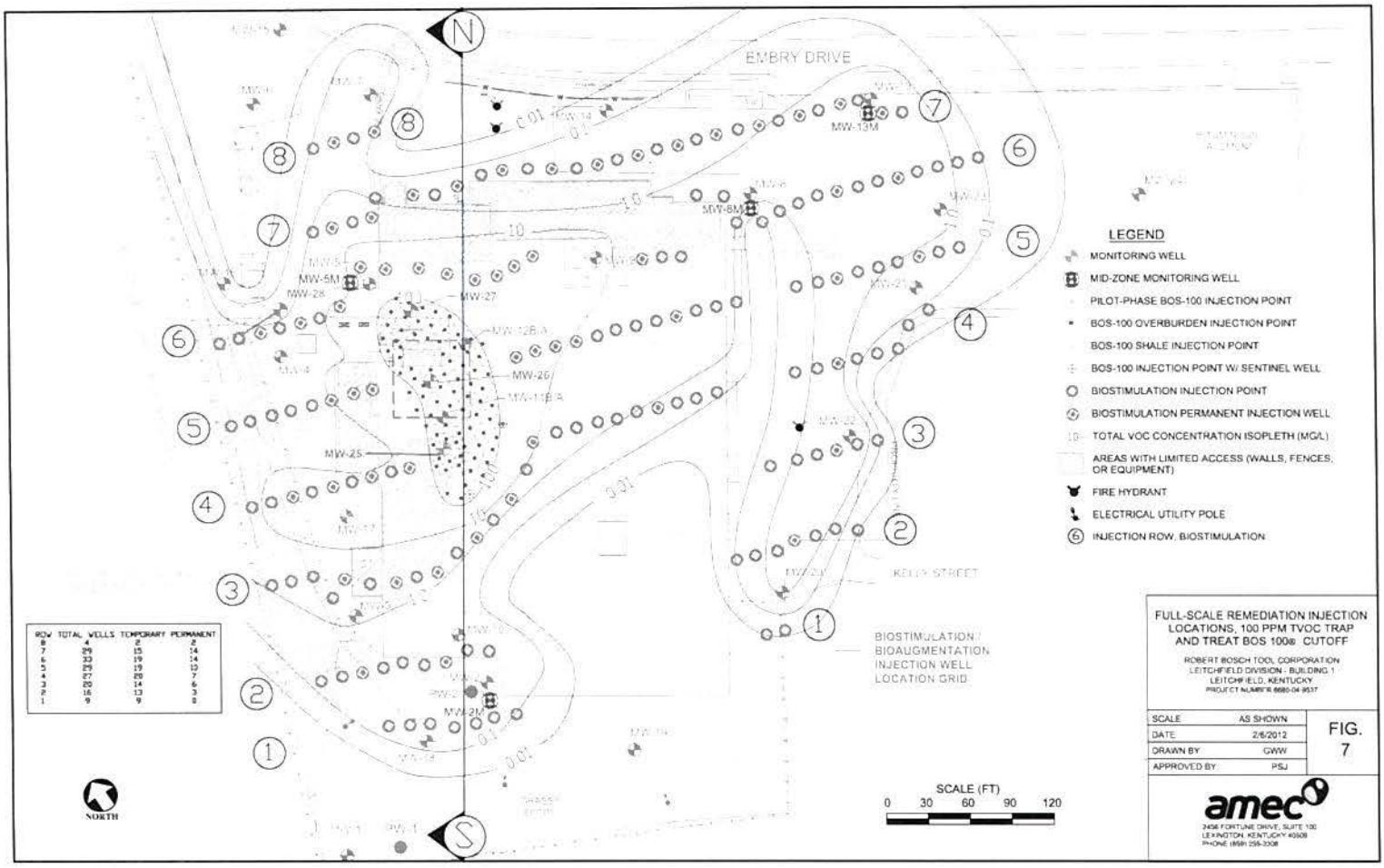
ROBERT BOSCH TOOL CORPORATION
LEITCHFIELD DIVISION - BUILDING 1
LEITCHFIELD, KENTUCKY

PROJECT NUMBER: 6680-04-9637

HORIZONTAL SCALE	1" = 80'
DATE	2/6/12
DRAWN BY	GWW
APPROVED BY	PSJ

FIG. 6

amec
2456 Fortune Drive, Suite 100
Lexington, Kentucky 40509
Phone: (859) 255-3308



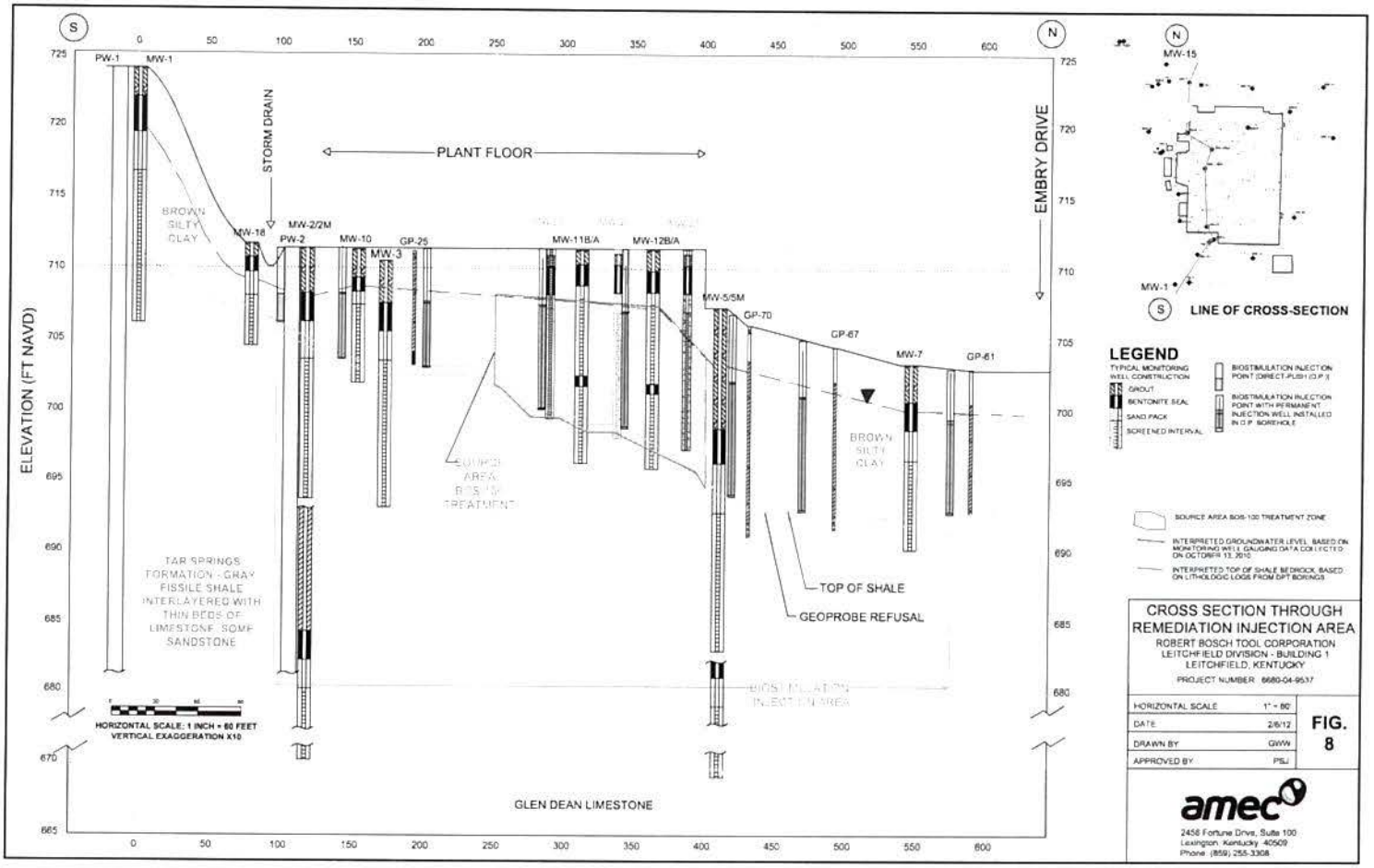
FULL-SCALE REMEDIATION INJECTION LOCATIONS, 100 PPM TVOC TRAP AND TREAT BOS 100® CUTOFF

ROBERT BOSCH TOOL CORPORATION
LEITCHFIELD DIVISION - BUILDING 1
LEITCHFIELD, KENTUCKY
PROJECT NUMBER 8680-04-9537

SCALE	AS SHOWN
DATE	2/6/2012
DRAWN BY	GWW
APPROVED BY	PSJ

FIG. 7

amec
2456 FORTUNE DRIVE, SUITE 100
LEXINGTON, KENTUCKY 40509
PHONE (859) 259-3308



LEGEND

TYPICAL MONITORING WELL CONSTRUCTION

- GROUT
- BENTONITE SEAL
- SAND PACK
- SCREENED INTERVAL

- BIOSTIMULATION INJECTION POINT (DIRECT-PUSH) (D.P.)
- BIOSTIMULATION INJECTION POINT WITH PERMANENT INJECTION WELL INSTALLED IN D.P. BOREHOLE

- SOURCE AREA BOS-100 TREATMENT ZONE
- INTERPRETED GROUNDWATER LEVEL BASED ON MONITORING WELL GAUGING DATA COLLECTED ON OCTOBER 13, 2010
- INTERPRETED TOP OF SHALE BEDROCK BASED ON LITHOLOGIC LOGS FROM DPT BORINGS

CROSS SECTION THROUGH REMEDIATION INJECTION AREA

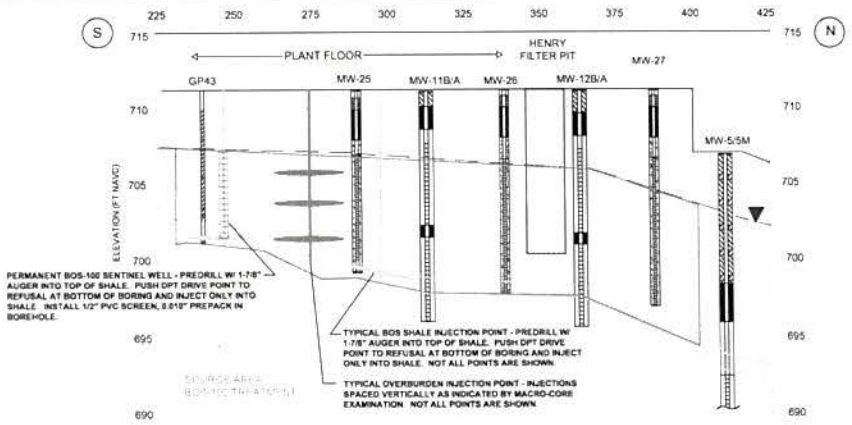
ROBERT BOSCH TOOL CORPORATION
LEITCHFIELD DIVISION - BUILDING 1
LEITCHFIELD, KENTUCKY

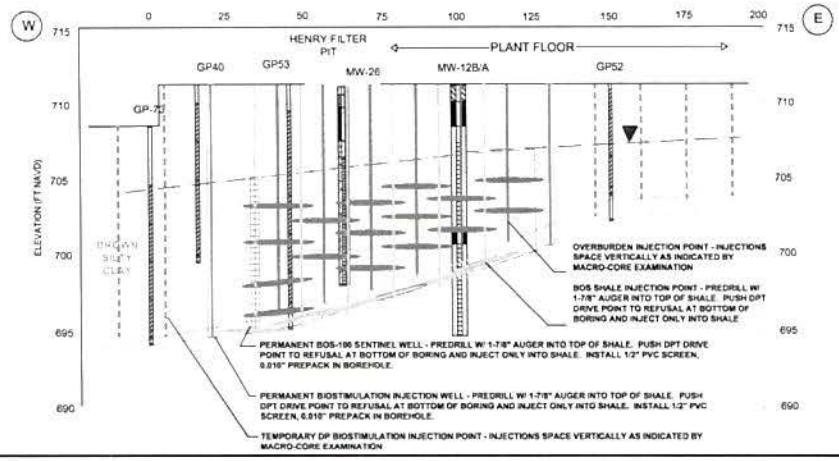
PROJECT NUMBER 6680-04-9537

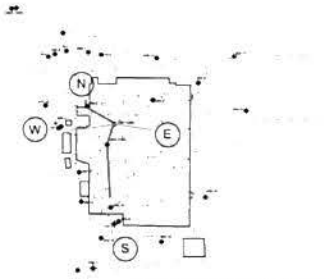
HORIZONTAL SCALE	1" = 60'
DATE	2/6/12
DRAWN BY	GWW
APPROVED BY	PSJ

FIG. 8

amec
2458 Fortune Drive, Suite 100
Lexington, Kentucky 40509
Phone: (859) 255-3308







LINES OF CROSS-SECTIONS

LEGEND

TYPICAL MONITORING WELL CONSTRUCTION

- GROUT
- BENTONITE SEAL
- SAND PACK
- SCREENED INTERVAL

SOURCE AREA BOS-100 TREATMENT ZONE

INTERPRETED GROUNDWATER LEVEL, BASED ON MONITORING WELL GAUGING DATA COLLECTED ON JUNE 18, 2008

INTERPRETED TOP OF SHALE BEDROCK, BASED ON LITHOLOGIC LOGS FROM DPT BORINGS

HORIZONTAL SCALE: 1 INCH = 30 FEET
VERTICAL EXAGGERATION X5

SOURCE AREA CROSS-SECTIONS

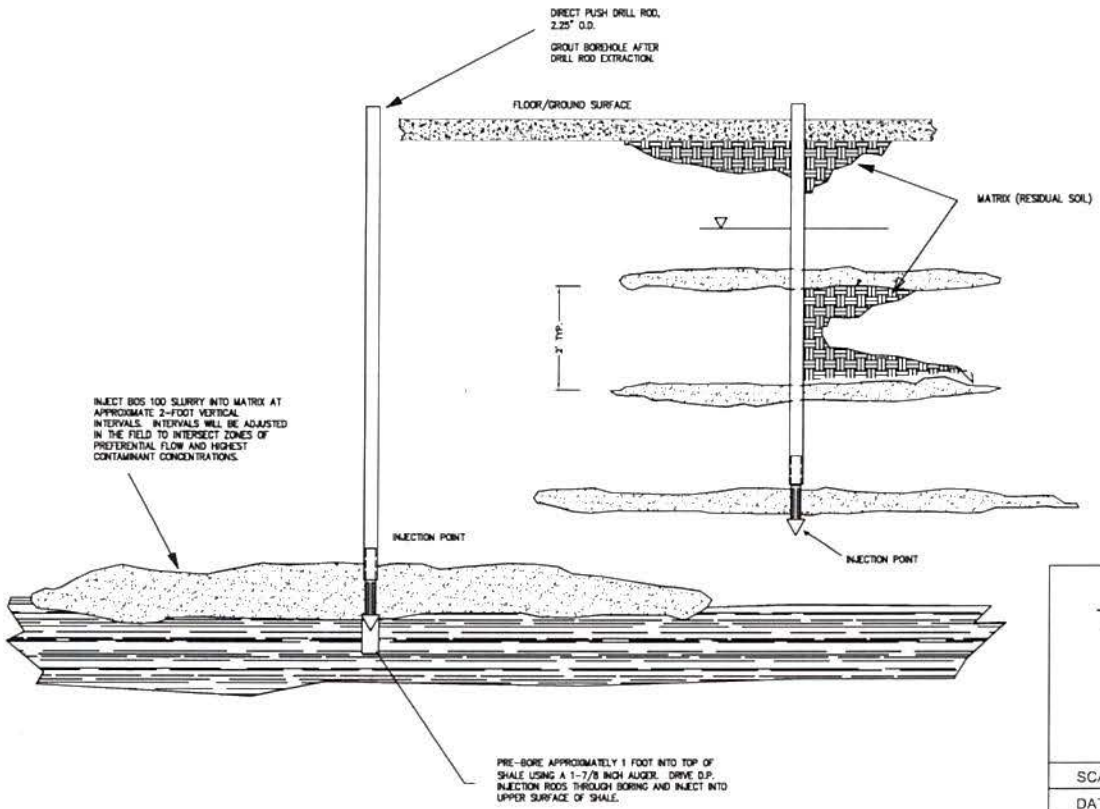
ROBERT BOSCH TOOL CORPORATION
LEITCHFIELD DIVISION - BUILDING 1
LEITCHFIELD, KENTUCKY

PROJECT NUMBER: 6680-04-9537

HORIZONTAL SCALE	1" = 30'
DATE	2/6/12
DRAWN BY	GWN
APPROVED BY	PSJ

FIG. 9

amec
2456 Fortune Drive, Suite 100
Lexington, Kentucky 40509
Phone (859) 255-3308



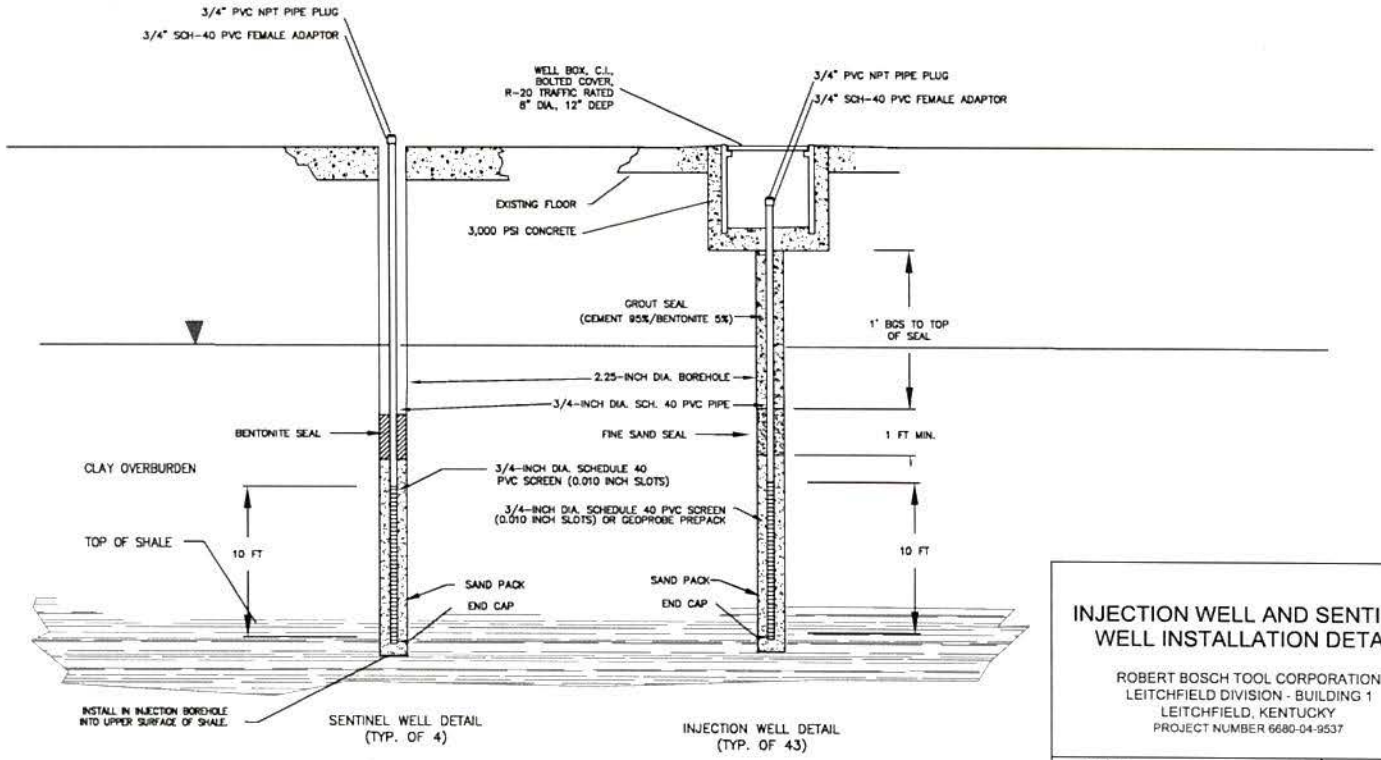
TRAP AND TREAT BOS-100® INJECTION PROFILE

ROBERT BOSCH TOOL CORPORATION
LEITCHFIELD DIVISION - BUILDING 1
LEITCHFIELD, KENTUCKY
PROJECT NUMBER 6680-04-9537

SCALE	NTS
DATE	12/12/2011
DRAWN BY	GWW
APPROVED BY	PSJ

FIG. 10

amec
2456 FORTUNE DRIVE, SUITE 100
LEXINGTON, KENTUCKY 40509
PHONE (859) 255-3308



INJECTION WELL AND SENTINEL WELL INSTALLATION DETAIL

ROBERT BOSCH TOOL CORPORATION
LEITCHFIELD DIVISION - BUILDING 1
LEITCHFIELD, KENTUCKY
PROJECT NUMBER 6680-04-9537

SCALE	NTS
DATE	1/13/2012
DRAWN BY	GWW
APPROVED BY	PSJ

FIG. 11

amec
2456 FORTUNE DRIVE, SUITE 100
LEXINGTON, KENTUCKY 40509
PHONE (859) 255-3308

APPENDICES

APPENDIX A

COLOR TEC FIELD SCREENING METHODOLOGY

APPENDIX A

COLOR TEC FIELD SCREENING METHODOLOGY

Color Tec is a field-screening methodology developed by Ecology and Environment, Inc. for evaluating total chlorinated ethene concentrations in the headspace above soil and ground-water samples. The method employs colorimetric gas detector tubes to analyze the headspace gases. Each colorimetric tube contains a catalyst that decomposes the chlorinated ethene, releasing hydrogen chloride, which discolors the reagent (4-phenylazodiphenylamine) in the tube. Any color change within the detector tube indicates the presence of chlorinated ethenes. The detector tubes are constructed of glass and printed with calibration scales to facilitate measurement of the linear extent of the reaction within the tube. Tubes are provided for a variety of concentration ranges. The lowest concentration tube is used initially to screen the sample. When a positive result is observed, the concentration level is obtained by matching the linear extent of the discolored reagent inside the tube to the calibration scale printed on the outside of the tube. If the calibrated range of the tube is exceeded by the reaction, a tube with a higher concentration range is used to screen a duplicate sample. This procedure is repeated until the approximate concentration is determined.

Water Samples

Fill a 40 milliliter (ml) volatile organic analysis (VOA) vial to approximately 60% of the volume of the vial and cap. Heat the sample and the detection tube in a water bath with a temperature of 100 to 110° Fahrenheit (F). When heated, the vial is shaken vigorously for 20 seconds. One end of the detection tube is broken and attached to a hand pump. The other end of the tube is broken and attached to a small extraction needle. The septum of the vial is penetrated with the extraction needle. A larger purge needle is used to penetrate the septum of the vial and the endpoint of the needle is positioned near the bottom of the vial. One stroke is pulled on the hand pump and the change in color of the tube is observed. The concentration reached by the change in color is recorded.

Soil Samples

Fill a 40-ml VOA vial with approximately 10 cubic centimeters of soil and 10 ml of deionized water (50 to 77% of the volume) and cap. The heating, sample preparation, and sampling procedures for water samples is followed. If there are no bubbles indicating that air is circulating into the vial, the purge needle should be removed, cleared, and reinserted into the vial.

General

The practical quantitation limit for tetrachloroethene (perchloroethylene, or PCE) is five to ten parts per billion (ppb) as measured in the headspace. This method does not employ Henry's Constant or other partitioning methods to back calculate the actual concentrations of soil or water samples. Samples containing only trans-1,2-dichloroethene, 1,1-dichloroethene, or vinyl chloride are generally not detectable with ColorTec at concentrations below 25 micrograms per liter (µg/l).

Other compounds, including bromine, free chlorine, and hydrogen chloride can also indicate a positive reaction within the detector tube. The colorimetric detector tubes are manufactured to detect specific alkenes. However, if there are other chlorinated ethenes present in a sample, the identification of a specific chlorinated compound is not possible using the ColorTec method.

APPENDIX B

CHEMICAL DATA

Material Safety Data Sheet
Trap & Treat® BOS 100®

Section

IDENTITY *(As Used on Label and List)* *Carbon (Chemical formula: C) 90 to 95%* *Metallic Iron (Chemical formula: Fe) 5 to 10%*	Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.
Manufacturer's Name *Remediation Products Inc.*	Emergency Telephone Number *303.487.1000*
Address *(Number, Street, City, State, and ZIP Code)* *6390 Joyce Drive, Suite 150 W, Golden, CO 80403*	Telephone Number for Information *303-487-1000*
Prepared by *T. Mecum*	Date Prepared *9/30/03*
Proper Shipping Name: Self-heating Solid, Inorganic N.O.S. Class 4.2, UN No. 3190, Packing Group II	Signature of Preparer *(optional)*

Section II - Hazard Ingredients/Identity Information

Non-hazardous components are listed at 3 percent (%) or greater. This is not intended to be a complete compositional disclosure.

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	%*(optional)*
Carbon	5mg/M^3 (respirable)	10mg/M^3 (Total)	N/A	90-95
Metallic Iron	"	"	N/A	5-10
N/A = Not Applicable PELs and TLVs are 8-hour TWAs unless otherwise noted.				

Section III - Physical/Chemical Characteristics

Boiling Point	N/A	Specific Gravity (H_2O = 1)	0.6 g/cc apparent density
Vapor Pressure (mm Hg.)	N/A	Melting Point	N/A
Vapor Density (AIR = 1)	N/A	Evaporation Rate (Butyl Acetate = 1)	N/A
Solubility in Water: Negligible			
Appearance and Odor: Black granules. No odor.			

Section IV - Fire and Explosion Hazard Data

Flash Point (Method Used) DOT Class 4.2 Self-heating Solid	Flammable Limits	LEL N/A	UEL N/A
Extinguishing Media Flood with plenty of water			
Special Fire Fighting Procedures The material itself is not spontaneously combustible but may cause other flammable materials to ignite.			
Unusual Fire and Explosion Hazards Contact with strong oxidizer, such as ozone, liquid oxygen, chlorine, permanganate, etc., may result in fire.			
NFPA Rating: Health=0; Reactivity=1; Flammability=1			

Section V - Reactivity Data

Stability	Unstable		Conditions to Avoid
	Stable	X	Contact with Air/Oxygen
Incompatibility *(Materials to Avoid)*			
Strong oxidizers, such as ozone, liquid oxygen, oxygen and air, chlorine, permanganate, etc., and acids.			
Hazardous Decomposition	May Occur	X	Conditions to Avoid - Strong oxidizers
	Will Not Occur		

Section VI - Health Hazard Data

Route(s) of Entry:	Inhalation? Yes	Skin? Yes	Ingestion? Yes

Health Hazards *(Acute and Chronic)*

When exposed to the air, rapid heating may occur that can cause fire or sever burns. Quench with water or Nitrogen gas to cool before handling. Forced air creates a faster reaction than incidental contact.

The effects of long-term, low-level exposures to carbon have not been determined. Safe handling of this material on a long-term basis should emphasize the avoidance of all effects from repetitive acute exposures.

Persons subjected to excessive dust will be forced to leave area because of nuisance; i.e., coughing, sneezing and nasal irritation.

CAUTION!!! This material removes oxygen from air causing a severe hazard to workers inside vessels and enclosed or confined spaces. Before entering such an area, sampling and work procedures for low oxygen levels should be taken to ensure ample oxygen availability, observing all local, state, and federal regulations.

Carcinogenicity:	NTP?	IARC Monographs?	OSHA Regulated?
N/A	N/A	N/A	Yes

Signs and Symptoms of Exposure

Effects and Hazards of Eye Contact: The physical nature of this product may produce eye irritation, if exposed to dusting conditions without protective eye equipment.
Effects and Hazards of Skin Contact: The product is not a primary skin irritant. The primary skin irritation (Rabbit) is 0.
Effects and Hazards of Inhalation Breathing): This product is practically non-toxic through inhalation. The acute inhalation LD_{50} (Rat) is >6.4 mg/l (nominal concentration). Could cause irritation to respiratory passages, if exposed to dusting conditions without protective respiratory equipment.
Effects and Hazards of Ingestion (Swallowing): Material is non-toxic through ingestion. The acute oral LD_{50} (Rat) is >10g/kg.

Medical Conditions Generally Aggravated by Exposure

N/A

Emergency and First Aid Procedures

Eyes: Flush with plenty of water for at least 15 minutes. Call physician if irritation continues.
Skin: Wash with soap and water.
Inhalation: Move to fresh air.
Ingestion: N/A

Section VII - Precautions for Safe Handling and Use

Steps to Be Taken in Case Material is Released or Spilled Wet spilled material to neutralize potential for fire.
Sweep or vacuum material from spillages into a waste container for disposal or repackage. Avoid dusting conditions.
Waste Disposal Method
Dispose of unused product in waste container. Dispose of in accordance with local, state, and federal or national regulations.
Precautions to Be Taken in Handling and Storing Minimize contact with air. When opening a drum of material, fill drum with water before handling.
CAUTION!!! This product removes oxygen from air causing a severe hazard to workers inside carbon vessels and enclosed or confined spaces. Before entering such an area, sampling and work procedures for low oxygen levels should be taken to ensure ample oxygen availability, observing all local, state, and federal or national regulations. Be sure proper ventilation and respiratory and eye protection are used under dusting conditions.
Other Precautions
Wash thoroughly after handling. Exercise caution in the storage and handling of all chemical substances.

Section VIII - Control Measures

Respiratory Protection *(Specify Type)* Carbon-A NIOSH-approved particulate filter respirator is recommended, if excessive dust is generated.		
Ventilation	Local Exhaust Recommended when used indoors or in confined spaces	Special Not Required
	Mechanical *(General)* Recommended when used indoors or in confined spaces	Other Not required
Protective Gloves Recommended	Eye Protection Safety glasses or goggles recommended	
Other Protective Clothing or Equipment Not required		
Work/Hygienic Practices Use of Tyvek® or Nomex® suits is suggested to protect skin from becoming excessively dirty and clothing from being ruined by contact with product.		

3-D Microemulsion (3DMe)™
MATERIALS SAFETY DATA SHEET

Last Revised: March 26, 2007

Section 1 – Material Identification

Supplier:

REGENESIS

1011 Calle Sombra
San Clemente, CA 92673

Phone: **949.366.8000**

Fax: **949.366.8090**

E-mail: **info@regenesis.com**

Chemical Name(s):	• Glycerides, di-, mono [2-[2-[2-(2-hydroxy-1-oxopropoxy)-1-oxopropoxyl]-1-oxopropoxy]propanoates] • Propanoic acid, 2-[2-[2-(2-hydroxy-1-oxopropoxy)-1-oxopropoxy]-1-oxopropoxy]-1,2,3-propanetriyl ester • Glycerol
Chemical Family:	**Organic Chemical**
Trade Name:	**3-D Microemulsion (3DMe)™**
Synonyms:	**HRC Advanced™ HRC-PED (Hydrogen Release Compound – Partitioning Electron Donor)**
Product Use:	**Used to remediate contaminated groundwater (environmental applications)**

Section 2 – Chemical Identification

CAS#	Chemical
823190-10-9	**HRC-PED**
61790-12-3 or 112-80-1	**Fatty Acids (neutralized)**
201167-72-8	**Glycerol Tripolylactate**
56-81-5	**Glycerol**

Section 3 – Physical Data

Melting Point:	**Not Available (NA)**
Boiling Point:	**Not determined (ND)**
Flash Point:	**> 200 °F using the Closed Cup method**
Density:	**0.9 -1.1 g/cc**
Solubility:	**Slightly soluble in acetone. Insoluble in water.**
Appearance:	**Amber semi-solid.**
Odor:	**Not detectable**
Vapor Pressure:	**None**

Section 4 – Fire and Explosion Hazard Data

Extinguishing Media: **Use water spray, carbon dioxide, dry chemical powder or appropriate foam to extinguish fires.**

Water May be used to keep exposed containers cool.

For large quantities involved in a fire, one should wear full protective clothing and a NIOSH approved self contained breathing apparatus with full face piece operated in the pressure demand or positive pressure mode as for a situation where lack of oxygen and excess heat are present.

Section 5 – Toxicological Information

Acute Effects: **May be harmful by inhalation, ingestion, or skin absorption. May cause irritation. To the best of our knowledge, the chemical, physical, and toxicological properties of the 3-D Microemulsion have not been investigated. Listed below are the toxicological information for glycerol, lactic acid and fatty acid.**

RTECS# **MA8050000**

Glycerol

Irritation Data:

SKN-RBT 500 MG/24H MLD	**85JCAE-,207,1986**
EYE-RBT 126 MG MLD	**BIOFX* 9-4/1970**
EYE-RBT 500 MG/24H MLD	**85JCAE-,207,1986**

Section 5 – Toxicological Information (cont)

Toxicity Data:	**ORL-MUS LD50:4090 MG/KG**	**FRZKAP (6),56,1977**
	SCU-RBT LD50:100 MG/KG	**NIIRDN 6,215,1982**
	ORL-RAT LD50:12,600 MG/KG	**FEPRA7 4,142,1945**
	IHL-RAT LC50: >570 MG/M3/1H	**BIOFX* 9-4/1970**
	IPR-RAT LD50: 4,420 MG/KG	**RCOCB8 56,125,1987**
	IVN-RAT LD50:5,566 MG/KG	**ARZNAD 26,1581,1976**
	IPR-MUS LD50: 8,700 MG/KG	**ARZNAD 26,1579,1978**
	SCU-MUS LD50:91 MG/KG	**NIIRDN 6,215,1982**
	IVN-MUS LD50:4,250 MG/KG	**JAPMA8 39,583,1950**
	ORL-RBT LD50: 27 MG/KG	**DMDJAP 31,276,1959**
	SKN-RBT LD50: >10 MG/KG	**BIOFX* 9-4/1970**
	IVN-RBT LD50: 53 MG/KG	**NIIRDN 6,215,1982**
	ORL-GPG LD50: 7,750 MG/KG	**JIHTAB 23,259,1941**

Target Organ Data: **Behavioral (headache), gastrointestinal (nausea or vomiting), Paternal effects (spermatogenesis, testes, epididymis, sperm duct), effects of fertility (male fertility index, post-implantation mortality).**

Only selected registry of toxic effects of chemical substances (RTECS) data is presented here. See actual entry in RTECS for complete information on lactic acid and glycerol.

Fatty Acids

Acute oral (rat) LD50 value for fatty acids is 10000 mg/kg. Aspiration of liquid may cause pneumonitis. Repeated dermal contact may cause skin sensitization.

Section 6 – Health Hazard Data

One should anticipate the potential for eye irritation and skin irritation with large scale exposure or in sensitive individuals. Product is not considered to be combustible. However, after prolonged contact with highly porous materials in the presence of excess heat, this product may spontaneously combust.

Handling: **Avoid continued contact with skin. Avoid contact with eyes.**

In any case of any exposure which elicits a response, a physician should be consulted immediately.

First Aid Procedures

Inhalation: **Remove to fresh air. If not breathing give artificial respiration. In case of labored breathing give oxygen. Call a physician.**

Ingestion: **No effects expected. Do not give anything to an unconscious person. Call a**

physician immediately. DO NOT induce vomiting.

Section 6 – Health Hazard Data (cont)

Skin Contact:	**Flush with plenty of water. Contaminated clothing may be washed or dry cleaned normally.**
Eye Contact:	**Wash eyes with plenty of water for at least 15 minutes lifting both upper and lower lids. Call a physician.**

Section 7 – Reactivity Data

Conditions to Avoid:	**Strong oxidizing agents, bases and acids**
Hazardous Polymerization:	**Will not occur.**
Further Information:	**Hydrolyses in water to form lactic acid, glycerol and fatty acids.**
Hazardous Decomposition Products:	**Thermal decomposition or combustion may produce carbon monoxide and/or carbon dioxide.**

Section 8 – Spill, Leak or Accident Procedures

After Spillage or Leakage:	**Neutralization is not required. The material is very slippery. Spills should be covered with an inert absorbent and then be placed in a container. Wash area thoroughly with water. Repeat these steps if slipperiness remains.**
Disposal:	**Laws and regulations for disposal vary widely by locality. Observe all applicable regulations and laws. This material may be disposed of in solid waste. Material is readily degradable and hydrolyses in several hours.**

No requirement for a reportable quantity (CERCLA) of a spill is known.

Section 9 – Special Protection or Handling

Should be stored in plastic lined steel, plastic, glass, aluminum, stainless steel, or reinforced fiberglass containers.

Protective Gloves:	**Vinyl or Rubber**
Eyes:	**Splash Goggles or Full Face Shield. Area should have approved means of washing eyes.**
Ventilation:	**General exhaust.**
Storage:	**Store in cool, dry, ventilated area. Protect from incompatible materials.**

Section 10 – Other Information

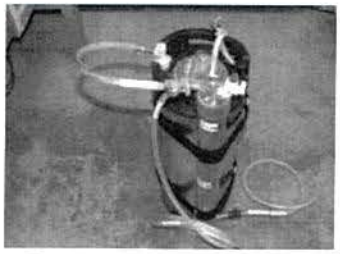
This material will degrade in the environment by hydrolysis to lactic acid, glycerol and fatty acids. Materials containing reactive chemicals should be used only by personnel with appropriate chemical training.

The information contained in this document is the best available to the supplier as of the time of writing. Some possible hazards have been determined by analogy to similar classes of material. No separate tests have been performed on the toxicity of this material. The items in this document are subject to change and clarification as more information becomes available.

Bio-Dechlor INOCULUM™ Plus

Product

Bio-Dechlor INOCULUM® Plus is an enriched natural microbial consortium containing species of Dehalococcoides sp. (DHC). This microbial consortium has since been enriched to increase its ability to rapidly dechlorinate contaminants during in situ bioremediation processes. Bio-Dechlor INOCULUM Plus has been shown to stimulate the rapid and complete dechlorination of compounds such as tetrachloroethene (PCE), trichloroethene (TCE), dichloroethene (DCE), and vinyl chloride (VC). The current culture now contains microbes capable of dehalogenating halomethanes (e.g. carbon tetrachloride and chloroform) and haloethanes (e.g. 1,1,1 TCA and 1,1, DCA) as well as mixtures of these halogenated contaminants.



The BDI Plus consortium is delivered on-site in an easy to handle cylinder.

Bio-Dechlor INOCULUM® Plus is provided in a liquid form and is designed to be injected directly into the contaminated subsurface. Once in place, this microbial consortium works to accelerate the extant rate of chlorinated ethene degradation. When faced with an insufficient quantity of critical dechlorinating microbes, Bio-Dechlor INOCULUM Plus supplies many beneficial chlorinated solvent degraders including the all important Dehalococcoides sp. required to achieve complete and rapid dechlorination of DCE and vinyl chloride.

This microbial consortium is compatible with most electron donors however it is often optimized with the addition of any of Regenesis' Hydrogen Release Compound (HRC®) and 3-D Microemulsion® products.

Functionality

Recent trends in engineered bioremediation indicate that the treatment of chlorinated solvent contamination can, under circumstances, result in the slow degradation of intermediate compounds. When faced with this problem, bioaugmentation with a microbial consortium such as Bio-Dechlor INOCULUM® Plus offers a solution to accelerate the complete dechlorination of these otherwise recalcitrant contaminants. Bio-Dechlor INOCULUM Plus can be used at most any stage of a project to ensure the rapid and complete degradation of chlorinated compounds. Specifically, Bio-Dechlor INOCULUM Plus can be added to an aquifer at the beginning of a project in situations where there is a lack of, or suboptimal populations of Dehalococcoides. Actual quantities of these organisms can be measured using Bio-Dechlor CENSUS (a real-time PCR technique) currently available through Microbial Insights at www.microbe.com.

Key References

- Sharma, P.K. et al. Bioaugmentation Pilot Test to Treat cis-1,2-Dichloroethene in Groundwater, Proceedings of the Fourth International Conference on Remediation of Chlorinated and Recalcitrant Compounds. **(2004)**
- **Sharma, P.K. et al. Bioaugmentation after a Stalled Biostimulation Application**, Proceedings of the Eighth International In Situ and On-Site Bioremediation Symposium. **(2005)**
- **Wright, W.W. et al. Bioaugmentation and Biostimulation of Recalcitrant Intermediate Chlorinated Compounds,** Proceedings of the Eighth International In Situ and On-Site Bioremediation Symposium. **(2005)**
- **Zacharias, H.N. et al. CVOC Remediation Using Bio-Dechlor INOCULUM and Diagnostics in a Methanogenic Aquifer,** Proceedings of the Eighth International In Situ and On-Site Bioremediation Symposium. **(2005)**
- **Ritalahti, K.M. et al. Bioaugmentation for Chlorinated Ethene Detoxification.** Industrial Biotechnology. **Summer 2005, 114-118.**

Product Categories

- Enhanced Aerobic Bioremediation
- Enhanced Anaerobic Bioremediation
- In-Situ Chemical Oxidation (ISCO)
- Enhanced Desorption
- Bioaugmentation
  - Bio-Dechlor INOCULUM™ PLUS
- Metals Immobilization

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- Request a Free Site Evaluation and Cost Estimate
- BDI Plus Product Brochure
- BDI Plus Application Instructions
- BDI Plus MSDS
- BDI Plus Pathogen Testing
- BDI Plus Reference List

APPENDIX C

TRAP AND TREAT BOS 100® DOSING CALCULATIONS

Appendix C - BOS 100 Dosing Calculations

Project: RBTC LDB #1, Leitchfield, Kentucky
Date: 11-15-11

BOS-100 Requirement, Source Area

Assumptions:

Pilot treatment in the concentrated source area achieved effective reduction in chlorinated VOC concentrations using 20 injection points over a 1,000 square foot treatment area (50 square feet per point or 7.07 ft grid spacing). Starting at 1-2' below the top of groundwater, 25 pounds of BOS 100 was injected at 2-foot intervals above direct-push refusal and a final injection of 75 pounds at refusal. Site investigation results have shown that permeability in the overburden tends to increase with depth and that the most permeable horizon is at the top of shale. Therefore, the 75-lb injections performed at refusal are likely responsible for the majority of CVOC removal.

Full-scale treatment will be performed using the same dosage rate as the pilot at the top or shale (75 lb BOS 100 per 50 square feet). Figure 7 shows an approximate layout for the injection grid with 130 total injection points. Of these, 55 borings are designated as "shale injection points" which are pre-bored with a small-diameter auger into the top of shale and receive only a single injection at the top of shale. The remaining 75 borings are designated "overburden injection points" and receive multiple top-down injections from approximately 2 feet below the top of groundwater to DP refusal. The final injection at refusal will receive 75 lbs of BOS 100.

C.1 **Calculate pounds of BOS 100 per injection at 50 ft2 area per point (7' spacing using "Shale" and "Overburden" points):**

Length of matrix area to be treated	150	ft
Width of matrix area to be treated	55	ft
Area of matrix to be treated	6,480	ft2

	Overburden Points	Shale Points	
Area with saturated thickness averaging 6'	600		South End (south of pilot area)
injection points at 1 point per 50 square feet	6	6	
BOS 100 injected in overburden at 15 lb/injection	60	0	2 intervals each
BOS 100 injected at top-of-shale	75	75	1 each
Total BOS 100 for area	810	450	
Area with saturated thickness averaging 8'	3,800		Middle Area (pilot area to Henry Filter pit)
injection points at 1 point per 50 square feet	47	29	
BOS 100 injected in overburden at 15 lb/injection	90	0	3 intervals each
BOS 100 injected at top-of-shale	75	75	1 each
Total BOS 100 for area	7755	2175	
Area with saturated thickness averaging 9'	2100		North Area (Henry Filter pit to MW-27)
injection points at 1 point per 50 square feet	22	20	
BOS 100 injected in overburden at 15 lb/injection interval	90	0	3 intervals each
BOS 100 injected at top-of-shale	75	75	1 each
Total BOS 100 for area	3630	1500	

Total injection points	130	points/borings
Total weight of BOS 100 required	16,320	lb
Weight of BOS 100 per drum	210	lbs/drum
Drums of BOS required (rounded up to nearest drum)	78	drums
Total weight of BOS 100 supplied	16380	lb

Prepared by: GWW 1/5/2012

Checked by: PSJ 1/16/2012

APPENDIX D

BIOSTIMULATION DOSING CALCULATIONS

Appendix D - Calculation of 3DMe Bioremediation Substrate Quantities

Project: RBTC LDB #1, Leitchfield, Kentucky
Date: 01-13-12

D.1 3DMe Dosage, Plume Area

Assumptions:

Pilot treatment injected 10 gallons per injection of amendment fluid between 1 foot below the top of groundwater at 2-foot intervals until direct-push refusal was encountered. While most injections posed no problems, with fracturing pressures of 200 psi or less, at least one location required 400 psi fracturing pressure and fluid surface around the drilling rod. Volumes have been biased to place a greater quantity near the top of shale and the smallest volumes near the ground surface. This will reduce chances of surfacing and place more amendment in the most permeable horizon. If surfacing does occur, depths may be increased to the shallowest injection or shallow injection volumes may be reduced and the excess volume transferred to the last injection at refusal.

3DMe must be diluted to at least 10 parts water to 1 part 3DMe concentrate or an unstable emulsion will result, with potential blinding of the aquifer. Injectate quantities selected are recommended by Regenesis as adequate to provide hydrogen for dechlorination for a period of two years after injection. An additional 50% is injected in the source area to account for more rapid depletion by sorbed CVOCs.

Injection Volumes and Intervals

Location	Injection Points	Surficial Aquifer Thickness (ft)	Injection Volumes (gal / interval)	3DMe Concentrate (gal)	Additional Mix Water (gal)	3DMe 10:1 Emulsion (gal)	3DMe 10:1 Emulsion (lb)	Total 3DMe Volume (gal / pt)
Plume (<10 mg/L)								
Rows 1-3	44	5	20, 60, 140	880	8,800	9,680	80,789	220
Row 4	18	5	20, 60, 140	360	3,600	3,960	33,050	220
Rows 5-8	79	9	20,20,40,140	1,580	15,800	17,380	145,053	220
subtotal	141						258,893	
Source Area (10-100 mg/L)								
Rows 3-4	10	7	20,40,60,210	200	2,000	3,300	27,542	330
Row 5	7	9	20,40,60,210	140	1,400	2,310	19,279	330
Row 6	9	9	20,40,60,210	180	1,800	2,970	24,788	330
subtotal	26						71,609	
Totals	334			3,340	33,400	39,600	330,502	

Source: Regenesis November 12, 2010 Proposal 2DD11098

Notes:
lbs = pounds
gal = gallons
pt = point

Prepared by/Date: GWW 1/13/12
Checked by/Date: PSJ 1/13/12